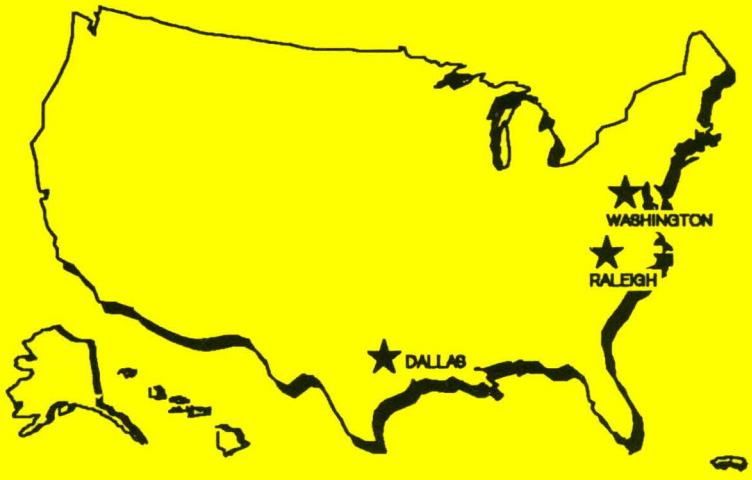
IBM

Telecommunications
Systems Support

IBM 9270/9274 Voice Response Unit Installation and Training Techniques

J. M. Edfors, CATS
G. W. Kerlin, CATS
J. A. Lyons, TSS
R. P. McQuail, TSS
J. D. Rutt, TSS
K. A. Small, CATS



Washington Systems Center
Technical Bulletin

GG66-3119-01

Washington Systems Center
Gaithersburg, MD
Technical Bulletin

IBM 9270/9274 Voice Response Unit Installation and Training Techniques

J. M. Edfors, CATS
G. W. Kerlin, CATS
J. A. Lyons, TSS
R. P. McQuail, TSS
J. D. Rutt, TSS
K. A. Small, CATS

GG66-3119-01
February, 1990

Second Edition, March 1990

About This Book

The reader of this document should become familiar with the general function and use of the IBM 9270/9274 VRU. The reader should also refer to the publications provided with the product. This document is not intended as a tutorial on the training and installation of the 9270/9274, and it is recommended that the reader use this as a supplement to the official 9270/9274 product publications.

What's New in This Edition

This updated edition includes the following major sections:

- **PART 1, VRU Installation and Training Techniques**, contains revisions and additions to the original (-00) version of the VRU Technical Bulletin. The bulk of the information and the techniques developed were acquired through the experience of working with the 9270 VRU.
- **PART 2, VRU Calling**, describes calls that the IBM VRU can transfer using a ROLM CBX switch capabilities and VRU application outline steps. This information applies to VRU installations and to VRUs used with the CallPath application.
- **PART 3, Advanced VRU Topics**, contains supplemental documentation on areas of application training that are the most difficult to develop. The topics include: Operator Screens, Repeating Fields, Manual and Auto Paging, Translation Table, and Foreign Languages. It also contains a checklist to help organize an installation.
- Additional Appendices have also been added to this publication.

  Appendix A. Questions and Answers, contains 78 questions selected from the INFO data base.

  Appendix B. 9270 Training Guidlines, contains 42 tips that were previously published as WSC Flash 8927.

Note: Six indivuduals have contributed to the various sections of this Technical Bulletin. The organizations represented are:

TSS: Telecommunications Systems Support - Washington

CATS: Computer Aided Telephony Systems - Santa Clara

Contents

Part 1, VRU Installation and Training Techniques

Part 2, VRU Calling

Part 3, Advanced VRU Topics

Figures

Part 1, VRU Installation and Training Techniques

Chapter 1. Introduction

1.1 Getting Started

If you are embarking on a project to develop an application for a VRU, you have an interesting challenge. Here are some general guidelines for you to follow:

- You should become familiar with the contents and organization of this Technical Bulletin. You can benefit greatly by following the tips and techniques presented here.
- Refer to the Install Checklist included in Part 3 of this publication.
- Obtain all of the VRU product reference material, (see section 1.6 in this chapter).
- Become familiar with the Sample Application that is distributed on "The Company" diskette, which ships with the VRU products. If you can build your unique application to be similar to the Sample Application, your development effort will be smoother and accomplished more quickly.
- Use diskettes with the correct density for your VRU system. After you have loaded the system files, format a blank diskette and Backup the system files onto the blank diskette. If you can reboot the VRU with your backup version of the systems files, then you have used the correct diskette. Format additional diskettes of the same density and label them for use with the VRU. See Chapter 4, section 4.3.2, "Saving to Diskette" for additional information.
- Install a serial printer on the VRU for any development effort. The printer can be used to print host screens and application listings. When the VRU is operational, the printer can be used document changes to the application and to print reports.
- Review the available VRU education courses. A PS/2 based VRU self study course, as part of the Personalized Learning Series, is available or a classroom equivalent course, G3722, may be attended. You should spend some time becoming familiar with the VRU and get some hands on experience before attending course G3722.
- At the start of your development effort, verify that the level of the software that you intend to use is correct for your environment. Your VRU environment consists of:
  - the level of the VRU software
  - the level of controller microcode (for 9274s only)
  - the VRU model
  - the type of emulation (3270 or 5250)

1.2 Recommended Skills

What kind of skills are required to successfully develop an application on a VRU? Generally, the technical person assigned to this task should have:

- knowledge of the host application interface
- an understanding of the VRU to host connection
- an understanding of the caller interface (messages, prompts and responses)
- an understanding of the telephony requirements for the VRU application
- a logical approach to designing an application (equivalent to application programming design skills)

If all of the skills specified above are not present in a single individual, then the person developing the VRU application will need to be able to communicate with the individuals who have those skills. Building a VRU application by selecting steps from a list on a screen is different from programming in a standard language.

1.3 Development Time

How much time should be allocated to develop your first VRU application ? This answer depends on a number of factors, such as the complexity of the application, the existence of a host application and the ability of the application developer to learn and adapt to the VRU system. The good news is that the development time for your second and third applications will be significantly less than what is required for the first application. Most customers will have need for more than a single application.

Experienced VRU developers working on their fifth application may complete the job in two or three weeks. The development scenario for the **first application** is more like the following:

- 1-2 weeks Initial VRU Familiarization
- 2-4 weeks Sample Application Study (The Company)
- 1 week VRU Education (PS/2 based self study, or classroom - G3722)
- 1-2 weeks VRU Application Design and Flowchart
- 4-8 weeks VRU Application Development
- 1-2 weeks VRU Application Test (Limited Production)

You may find that your development cycle is less than this minimum estimate or more than the maximum estimate. The purpose in providing these estimates is to encourage you to lay the proper foundation in learning about the VRU, as indicated in the first four steps above. If this is done, then the estimates for the last two steps of development and testing should prove to be reasonably accurate.

1.4 VRU Application

A typical place to install a VRU would involve a call center with agents answering customers telephone calls and providing information from their terminals which are logged on to a host. Information could also be collected and provided to the host application. Your VRU application running in a 9270 takes the place of four agents (people), four phones, and four display terminals attached to and logged on to the host application. (With the 9274, replace "four" with "twelve" in the previous sentence.)

The application developer will find that it takes some time to adjust to the VRU environment. A partial list of some of the basic and new VRU concepts to be mastered includes: the Logon process, Base Screen concept, Initial Screens list, VRU Error Recovery, Modifying Data, processing Repeating Fields, Screen Identification, processing Multiple Expected Screens, Operator Screens, Translation Tables, SENDs and RECEIVEs, Speak a Message, and System Test. The application developer will implement the required VRU functions by selecting steps from menus and expanding those steps.

Remember to keep the End-User (i.e., the caller) Interface as simple as possible. Specifically, make the prompts to the caller (your customer) pleasant and the data requested as input should be as short and simple as possible. For example, the host application may require a specific transaction ID or string of characters, such as

WXYZ or ***89#**

but the caller's input can be a single digit. The VRU can be trained to accept the single digit and to supply exactly what the host application needs.

1.5 VRU Menus

The VRU Menus are shown in Appendix D. Option 1 on the Main Menu contains **Put Module On-line**. To exercise this option, you have to have a VRU application available for execution. This means that you will have to create and save an application or load one which already exists onto the hard disk. Spend a few moments to study all of the menus shown in Appendix D.

1.6 9270 Documentation and Reference Material

This section identifies the documentation that is available to support the installation and use of the IBM 9270/9274 Voice Response Unit (VRU). The VRU publications are not automatically shipped with the product; they must be ordered separately.

In this document, "9270/9274 Training and Operations Guide" refers to SU31-0041, "9270/9274 Training and Operations Workbook" refers to SU31-0042, and "Planning, Installation, and Maintenance Guide" refers to SU31-0043 or SA38-1001 for the 9270 and 9274, respectively. Note that there will be a charge for the publications which start with an "S." There is no charge for the GI publication or for the VRU Technical Bulletin.

For convenience, the single Bill of Forms Number **SBOF-2192** may be used to order the following five publications for the 9270:

- System Administrator Training and Operations Guide SU31-0041
- System Administrator Training and Operations Workbook SU31-0042
- 9270 Planning, Installation, and Maintenance Guide SU31-0043
- 9270 General Information GU10-3000
- Installation and Training Techniques Technical Bulletin GG66-3119

For convenience, the single Bill of Forms Number **SBOF-1492** may be used to order the following five publications for the 9274:

- System Administrator Training and Operations Guide SU31-0041
- System Administrator Training and Operations Workbook SU31-0042
- 9274 Planning, Installation, and Maintenance Guide SA38-1001
- 9274 General Information GA38-1000
- Installation and Training Techniques Technical Bulletin GG66-3119

The Guide, SU31-0041, and the Workbook, SU31-0042, and the Technical Bulletin all contain "9270/9274" in the official title of those publications.

1.7 9270 Related Materials

The following VRU related materials are available:

- VRU Worksheets can be obtained by the IBM account team from MKTTOOLS; the name of the package is VRUWKSH. The 10 worksheets will help you document and develop the application.
- VRU education has been announced, see Announcement Letter 490-013. "IBM 9270/9274 VRU Implementation" has a course number of G3722. The PS/2 based VRU self study course, as part of the Personalized Learning Series, is another educational alternative.
- Review any recent or pertinent VRU Flash from the Washington System Center. Some of the WSC Flashes available are:

  WSC Flash 8945 9270 Foriegn Language Training Notes

  WSC Flash 8932 IBM 9270 VRU Release 2 Notes

  WSC Flash 8927 9270 Training Guidelines (included in Appendix B)

  WSC Flash 8850 9270 Voice Response Unit Capacity Planning

- The recent VRU product Announcement Letters are:

  AL 189-190 (5/12/89), 9274 VRU

  AL 189-191 (5/12/89), 9270 Model 40 VRU

Chapter 2. Installation Planning

2.1 Terminal Support

The 9274 PIM Guide and 9274 GI publications describe the display terminals that are supported by the 9274.

The 9270 PIM Guide and GI publications describes in detail the display control units and the types and features of the terminals that can be emulated by the 9270, both in host connect mode and in stand alone, or "training" mode. The 5250 environment is also discussed. The information which follows pertains to the 3270 terminal environment only.

The following points should be considered when selecting a 9270 operator terminal and the mode of attachment of the 9270 to a host application:

- The 9270 may be attached to a 3174 display control unit via a coaxial cable only.
- Screen sizes between 1,920 and 3,440 characters are supported by the 9270.
- A screen sizes of 1,920 is supported by the 9274.
- Only the standard 104-key 3270 typewriter, 3270 data-entry keyboards, or the Converged 122 key typewriter (or data entry if configured as a base keyboard) are supported.
- The extended 3270 data stream is not supported.
- The 9270/9274 emulates a 3270 terminals in Control Unit/Terminal (CUT) mode.

Be sure that the 3270 model chosen for the 9270 training terminal is capable of running in the above mode. With some display types, such as the 3192 Model D30, the internal setup function may need to be run to set the screen size and other internal parameters so that the terminal will communicate with the 9270. Consult the documentation accompanying the terminal for the proper procedures to follow to run the setup function.

The 3174 ports to which the 9270 will be attached may also need to be reconfigured through the 3174 customization process if they do not support the above requirements. Refer to the appropriate 3174 publications for details.

Note: If a terminal with a non-supported keyboard is attached to the 9270 which is running Release 2 of the VRU software, a "2%%" error code is displayed in the Operator Information Area of the terminal. In some cases, disconnecting and reconnecting the coaxial cable between the 9270 and the terminal used as the console may clear this condition, but the keys on the keyboard may not all function normally (i.e., as they are marked). With Release 3 of the VRU software, the same non-supported keyboards cannot be made to work simply by removing and reconnecting the coax cable.

The default mode of terminal operation for the 9270 is the emulation of a 3279 Model S2A terminal. The closer the selected terminal is to operating like this type of terminal, the simpler the setup process will be.

2.2 9270/9274 Host Connection

2.2.1 9274 Host Connection

Terminal controllers have traditionally been designed and built to attach **locally** to a host computer channel or **remotely** via a link to a communication controller. If the communication controller function is integrated under the covers of the host CPU, a link attached controller is still referred to as a Remote controller even if is located only six feet from the host.

The 9274 has been designed as a Remote SNA controller with 3270 terminal emulation, VRU functions and telephone ports. The 9274 supports a single link to a single host. Depending on the distance and speed of the link, the 9274 may be attached to the communications controller in the following ways:

- modem eliminator
- pair of modems
- pair of CSU/DSUs

See the 9274 PIM Guide, SA38-1001, for additional details.

2.2.2 9270 Host Connection

In 3270 emulation mode, the 9270 attaches to a 3174 controller via a coax cable. The 3174 controller manages the host connection, which means that it could be a local controller, a remote controller, or a controller on a token-ring. See Question 19 on page A-8 for additional information related to 3174s.

In 5250 emulation mode, the 9270 can connect via a twinax cable to a suitable host, such as an AS/400, S/38 or S/36. See the 9270 PIM Guide, SU31-0043, for additional information.

2.3 Connection to Telephone System

2.3.1 Telephony Interface

The 9270 supports one primary and one referral telephone connection for each associated host connection. The primary connection is required; the referral connection may be used for dual-line transfers in systems that do not support hook-flash transfers. Note that if the referral port is used to transfer a call, the associated primary port will be busy until the caller hangs up. Each telephone connection appears to the supporting CBX, PBX or Central Office (CO) as a standard 2500 analog telephone set conforming to EIA Specification 1378. Standard RJ-11 or RJ-18 connectors are used for each telephone line, depending on whether the VRU is connected to a Central Office line or not. See the Planning, Installation, and Maintenance Guide for more information on when each type of connector is required.

2.3.2 Telephone Signal Recognition and Generation

The VRU can accept up to ten DTMF tones per second. Each tone must have a minimum "on-time" of 50 msec and a minimum "off-time" of 40 msec. The VRU will also recognize the Bell Standard (both Old and Precision) dial tone, ring-back, busy tone, and re-order (network busy) signalling tones.

The VRU can dial out using either DTMF tones or rotary pulses. The DTMF "on-time" is 78 msec; the "off-time" is adjustable, with a 78 msec default. Pulse dialing has a 40 msec make time and a 60 msec break time with 800 msec between digits.

The VRU recognizes disconnect by detecting line current interruption, dial tone, or by the detection of the expiration of a configurable timeout interval. Line current interruption is detected in less than one second, while dial tone detection takes about 7 seconds. The default method of disconnect detection for the VRU is via line current interruption. The user should determine the method that his switch uses to signal disconnect and should set the line configuration defaults appropriately.

Note: Most ROLM and IBM CBX systems use dial tone to signal disconnect. For proper operation, the method that the VRU uses to detect disconnect should be changed to "Dial Tone" under the "Configure Telephone Lines" selection of the Configuration Menu. Refer to the Training and Operations Guide for more detail.

Users of PBX systems that do not signal disconnect via either current interruption or dial tone should adjust the timeout interval and the number of retries used when waiting for input from the caller to a value small enough to detect disconnection. When setting the above timeout value, the provision for adequate "think time" for the caller should also be considered.

2.3.3 Outbound Calling Capability

The VRU is capable of originating outbound calls. The primary use of this capability is to provide for the transfer of callers from the primary or referral port of the VRU to another number in the customer enterprise, but the VRU can also be customized to originate calls into the public network. Outbound telephone numbers for the VRU to dial in this mode may be furnished by the host system, they may be internally generated by the VRU application, or they may be input in limited number by the VRU System Administrator during the training process.

For a discussion of some limitations on dialing out, see Chapter 10 in Part 2 of this publication.

2.4 Serial Printer Attachment

2.4.1 Printer Interface Description

A PC-type serial printer can be optionally attached to a port on the 9270 or 9274. See the Planning, Installation, and Maintenance Guide for details on the cable configuration, printer switch settings, and mode of connection.

While the printer is considered optional, it has been found to be extremely useful for printing hard copies of training reports for later reference, and also for

printing statistical transaction reports and operational logs that are generated during on line operation of the 9270.

2.4.2 Screen Prints

The keyboard on the console of the 9270 or 9274 has a screen print key which can be used at any time to print the current VRU screen. This is a great way to document host screens or to print a subset of the VRU applications screens on which you are working. See Question 36 on page A-16 for additional information.

2.5 PC Processing of 9270 VRU Log Records

This section discusses the collection of IBM 9270 VRU log records from a personal computer. There are two formats used in log record reporting. The first type is PRINTER format, which lists log record information in a tabular fashion for printer output. The second type, which is Comma Separated Value (CSV) format, was specifically designed to create an information set in machine readable format. Here, the focus is on how to collect CSV information on the PC along with the VRU configuration issues that may arise through the collection of this data.

2.5.1 PC Connection to IBM 9270

Log Data is written from the VRU serial printer or communications port, located on the rear of the 9270 system unit. The communications port is a 25 pin, D-shell connector (DB25), located about half way down the rear VRU panel on the right side of the terminal/LAN jacks. This is an RS-232-C DTE interface, which implies that you must use a special crossover cable or use DCE devices, such as modems, between the VRU and Personal Computer. The PC must be running an asynchronous communications program and be configured with the proper asynchronous communications hardware (for further information, refer to the IBM 9270 Planning, Installation and Maintenance Guide SU31-0043).

In order to setup and test the connection of the 9270 to the PC:

- Configure the personal computer with asynchronous communications hardware and software

  HARDWARE
  - Most PCs are equipped with asynchronous, serial communications ports. They can be recognized, on the rear panel of the PC, as a male, 25 pin, D-shell connector (DB25).
  - Be sure that the serial communications card is installed and physically configured to operate from the proper logical port (i.e. COM1 or COM2), if needed.
  - The serial communications ports on the PC and the VRU are RS-232-C disciplined interfaces. Depending on the communications configuration, the user may need to supply a *modem eliminator* or a *cross-over cable* to attach the PC serial port to the 9270 serial port.

  SOFTWARE
  - Most asynchronous communications software packages will work fine, provided that the emulation and communications parameters can be set and user data can be *captured* to a flat, ASCII file.

  - Communications should be setup for 2400 bps using 7 data bits and 1 stop bit. Parity should be set to *space* or *none*.
  - Emulation should be configured as an IBM 3101 terminal or compatible. Auto-newline and auto-linefeed should be disabled. The end of line sequence is CR-LF, and this connection operates in full duplex.
- Execute PC communications software and establish local communications mode (online)
- On the VRU training terminal, from the On-Line Menu, select option 5; Display Reporting Menu. Then select option 5 once more; Display a Hardware Configuration Report (refer to IBM 9270 System Administrator Training and Operations Guide SU31-0041)

This should cause the 9270 hardware configuration report to be displayed on the PC Monitor. If no information is displayed on the PC monitor, there is probably a problem with the communications link between the VRU and the PC. If there are seemingly random characters appearing on the PC monitor, the problem is probably with the PCs' communications software parameters. In general, if there are problems, start with the PCs' communications software parameters and check each element of the link back to the VRU. For assistance in this area refer to the IBM 9270 Planning, Installation and Maintenance Guide (SU31-0043).

2.5.2 Capturing 9270 Logged Data

Once the PC to VRU connection is made, anything that is presented to the VRU serial port will scroll across the PC monitor. In order to capture this data to a disk file for subsequent processing, the PCs communications software must support a "file capture" function which records the data that is on the PC monitor to a disk file. This information can then later be applied to spreadsheets, customer report generators and/or imported into existing management applications.

When logged information is reported in PRINTER format, it does not matter that the log reports might go to the same printer as the statistics reports since reports just spool off one at a time. However, if you are collecting both CSV data and statistics to the same PC, you'll end up with a disk file containing all statistics reports (in tabular, printer format) along with interleaved records of comma separated log records. This situation is manageable but a bit cumbersome. The user is left, in this situation, to using a custom parsing routine to separate the data intended for direct printing from the CSV data, which is intended to be stored on a disk file for further processing or exporting. This "parsing" step is only necessary if you are using a single VRU unit.

If you have the luxury of having more than one 9270 VRU unit on a VRU network, the system allows for different report data to be routed to individual VRU units for printing and/or collection. For example, it is possible to have two 9270s in a common network; one collecting log records and the other printing statistics reports. This is accomplished through VRU network configuration (see IBM 9270 VRU System Administrator Training and Operations Guide SU31-0041 for further information). Multiple reporting targets will remove the need for reprocessing the information to separate statistics reports, which were intended for a printer, from the CSV data, which was intended to be machine collected.

2.6 VRU Capacity Planning (telephony)

Note: The discussion below assumes a basic knowledge of traffic engineering principles and techniques. This knowledge is required to support any but the simplest of VRU installations. If the reader intends to support a 9270 VRU installation with more than a few lines and does not possess this knowledge, a person with knowledge of traffic engineering should be located to assist with the installation.

Predicting the number of VRU's required for a given customer application is an important part of the installation planning process for the VRU. A correctly sized VRU installation will provide the customer with adequate capacity to handle the busiest periods of his application usage, while still offering a cost effective solution for the customer's requirements. The IBM VRU may be installed by itself, or it may be installed to work in conjunction with an Automatic Call Distribution (ACD) System. In the ACD environment, the design of the ACD system itself will determine the total number of VRU ports required. An ACD Engineer or IBM Call Center Specialist should be involved in the VRU installation process to help determine the exact number of VRUs required if the VRU is expected to interface with an ACD System.

When the VRU is installed in the non-ACD environment, the total number of VRU's required to meet the customer's service level requirements is determined by the application of standard traffic engineering techniques.

The two most important pieces of information required for VRU capacity planning are the expected level of Busy Hour Calls and the estimated Call Holding Time for the VRU application. "Busy Hour Calls" is a standard telephony term, and it is defined as the number of calls that will be received in the busiest hour of an average day in the busiest month. The number of Busy Hour Calls is used to determine how much equipment will be required to provide adequate service at the customer's busiest time. "Call Holding Time" is also a standard telephony term, and it represents the average amount of time that a call uses the telephone facility, which in this case is the VRU Application.

To determine the number of Busy Hour Calls and the Call Holding Time for the VRU, a traffic study should be performed. If an application already exists, the statistics, billing records, and trunk monitoring data that the customer can gather should provide a fairly good estimate of the level of Busy Hour Calls, while a "walk through" of the transactions that are expected to take place on the VRU should provide a reasonable estimate of the Call Hold Time. If an application does not exist, the customer will need to come up with reasonable estimates through modelling and simulation to arrive at the above.

2.6.1 Calculating the Level of Busy Hour Calls

The IBM 9270 VRU Busy Hour Calls simply equals the number of calls to the IBM 9270 VRU in the IBM 9270 VRU's busiest hour.

2.6.2 Calculating Call Hold Time

The formulas below can be used to calculate the VRU Call Hold Time:

- IBM 9270 VRU Call Hold Time = Call Setup Time + Talk Time (or VRU Transaction Time) + VRU Work Time.
- IBM 9270 VRU Call Setup Time = Seconds used for ringing, disconnecting or dialing (on outgoing calls only).
- IBM 9270 VRU Work Time = Seconds used to get ready for the next call.

Call Setup Time can include ring time and the time it takes to recognize a disconnect.

VRU Work Time is analogous to the time it takes the "live agent" in a Call Center to prepare for the next call. For the VRU this could be the time it takes to get back to the Base Screen in the Host Application after completing a transaction.

2.6.3 Growth and Overhead

Most installations will require some amount of additional capacity to allow for growth. Growth can be factored into the capacity planning calculations as a percentage of increase in overall traffic. The amount to allow for growth is dependent on the customer's future plans and expectations for the IBM 9270 VRU application.

Some additional capacity for overhead, safety margin or redundancy may also be desirable. The amount to allow is dependent on the volatility of the application, desired availability and customer needs.

2.6.4 Demand Stimulation

Demand Stimulation is a phenomenon that results in the generation of additional traffic due to the installation of an IBM 9270 VRU. In many cases, after a VRU is installed callers will call more often because the VRU provides an increased level of functionality and easier access than the previously used caller interface. The degree of Demand Stimulation present in an application can be difficult to predict and may influence Overhead calculations.

2.6.5 Calculating Total VRU Traffic

The following formula is used to convert the VRU traffic to Erlangs, add in the customers expected growth, stimulation and any cushion or overhead factor the customer may desire:

VRU Call Hold Time in seconds X Busy Hour calls
/3600 seconds per hour + % Growth + % Stimulation + % Overhead =

Erlangs of Traffic in the Busy Hour

Use the calculated Erlangs with the customer's acceptable level of blockage to find the number of facilities (VRU lines) required from the Erlang B Table included in Appendix E of this document.

2.6.6 Calculating the Number of VRUs Required

To determine the number of IBM 9270 VRUs required, divide the number of lines required by four and round up. (Each IBM 9270 VRU is equipped with 4 line interfaces.)

2.6.7 Estimating the Number of IBM 9270 VRUs in an ACD System

As mentioned above, in ACD Call Centers, the ACD design determines the number of VRUs that will be required. It is possible, however, to calculate the range of lines an ACD Engineer's calculations will probably fall within to allow a reasonable estimate to be achieved.

The Erlang B Table will provide a conservative number of facilities, known to be more than an ACD system would require for the same amount of given traffic. On the other hand, the ACD can't be more than 100% efficient, so allowing each Erlang of traffic one VRU line would show the fewest possible number of lines the application could have.

Note: The information above was extracted from Washington Systems Center Flash 8850.7, titled "9270 Voice Response Unit Capacity Planning." Refer to this flash for more detailed information, with examples included, on sizing the 9270 installation.

Chapter 3. Initial Installation and Setup

3.1 Training Environment

When performing the initial training and customization of the VRU, it is recommended that the VRU and its associated 3270 operator terminal be installed in a reasonably quiet work area within reach of a touch tone telephone. It is also convenient, but not required, to have access to a terminal directly attached to the host application to verify logon sequences and application access command flow, if necessary. The above components need to be close together for several reasons:

- During the process of installation and setup, the VRU system administrator will have to insert diskettes in the VRU diskette drive to load the system software.
- Refer to the sample application on "The Company" diskette.

  Note: This sample application should be thoroughly studied and understood before attempting to create your first application.
- During the training process of creating a new application, the work should be backed up to formatted, High Capacity diskette on a regular basis. See section 4.3 in the next Chapter for additional information.
- Access to the telephone is needed for testing a new application, and also for voice input if the customer decides not to use the optional microphone and headset for input.

3.2 Equipment Required for Training

Listed below is the equipment that is required to perform application training in the VRU host attached environment.

- Push Button DTMF Telephone and Line and at Least 1 Incoming Analog Telephone Line to VRU; or (Optional) Head Set and Microphone for Voice Input
- 3270-Type Terminal
- 3270-Type Control Unit, such as the IBM 3174 terminal controller, with Access to Host Application that Displays Data on 3270 (If 9270 is to interface with host application)
- Serial Printer (Optional, but highly recommended)
- Power Connection for VRU, 3270, and Printer

If the customer is not going to attach the 9270 to a host processor (No-Host Option), a 3270 terminal is still required to communicate with the VRU and to create the VRU application.

3.3 Microphone and Headset vs. Telephone

The difference in quality between voice input made with a telephone and that made with a microphone is noticeable, since the microphone provides substantially higher fidelity in recording than the standard telephone handset does. The amount of difference that is apparent to the caller depends on the type of telephone the caller is using as well as the quality of the connection that exists to the VRU.

Another advantage of using the microphone is that it makes the process of inputting the voice training much more comfortable and less fatiguing to the person who is doing the recording. This can be especially important if the customer has a requirement for a large spoken vocabulary on the VRU.

In addition, the headset may be used to monitor calls received by an individual VRU port while the VRU is online. This can be useful for testing and debugging the VRU Application and for determining if there are any problems with caller interaction with the Application.

Chapter 4. Entering Application Outline Training

4.1 Application Outline Training Documentation

Detailed explanations of the VRU Application Training procedures are contained in the Training and Operations Guide. An extensive sample application development scenario ("The Company"), along with complete Application and Screen Training listings is contained in the Training and Operations Workbook. The sample VRU application contained in the Workbook implements almost every Application and Screen Training option possible with the VRU. The user is urged to become familiar with both the organization and content of this material before beginning the process of application coding.

For ideas on how to document the VRU application you will develop, see Question 8 on page A-4.

4.2 Coding Conventions

The following techniques and conventions have been found to simplify the process of application training on the VRU. While the use of these conventions is not required, a VRU application that uses them will be easier to document, debug, modify, and expand.

4.2.1 Consistency

The VRU user interface is sensitive to both upper and lower case input from the training terminal. If the VRU training terminal has an upper/lower case switch (on some terminals this is marked with an "A,a" in one position, and an "A" in others), it should always be in the position that allows both upper and lower case to be displayed ("A,a"). When a VRU variable (a Label, Field, or Vocabulary entry) is input, for example, the names "Fieldname," "fieldname," and "FIELDNAME" would be stored as three separate variables because of their differing capitalization. Because of this, it is recommended that all Label and Field Names be input in upper case. This consistent format not only eliminates any confusion about the names, but it also will make the Labels and Field Names stand out in the application outline listings. Vocabulary items are identified by the VRU in the same way, and consistency in the entry of these items is also important. The capitalization and punctuation of vocabulary entries will be discussed in more detail below.

It is strongly recommended that a consistent format for entering VRU variables be adopted and used throughout the VRU Application Training Outline.

4.2.2 Screen Names

Screen names can be up to eight characters long and can contain blanks, the underline (_) and hyphen (-) characters. Screen names that are descriptive of their source or use, for example, VTAM, CICS, BLANK, LOGON, INPUT, and so on, will make it easier to understand the application outline listing.

4.2.3 Application Outline Labels

Application Outline Labels can be up to 14 characters long, and can contain any letter, number, or special character, including spaces. The use of Labels that describe the function of the step, such as "CONTINUE?," "ASK AGAIN," "SPEAK BALANCE," and so on can make understanding the application flow easier. VRU application labels should be **CAPITALIZED**.

4.2.4 Fields

The VRU uses a type of variable called a "field" to access DTMF data input by the caller, information on the 3270 screen it receives, and data that has been stored internally by the VRU application. These fields are called Telephone Input Fields, Screen Fields, and Operator Fields.

Screen Field names, Telephone Input Field names, and Operator field names can be up to 14 characters in length, and can contain the same characters as Application Outline Labels. Field names should be **CAPITALIZED**.

4.2.4.1 Screen Fields

Screen Fields contain selected information from a 3270 screen that is read by the VRU. It is recommended that Screen Field names be preceded by an "S" so that they can be easily identified in the application outline listing. Some examples are:

"S INPUT"
"S ACCOUNT"
"S CHECK NUMBER"
"S BALANCE"

4.2.4.2 Operator Fields

Operator Fields are defined by the user during Application Training, and are used for manipulation and storage of constants, Telephone Input Fields, or Screen Field data. It is recommended that Operator Field names be preceded with an "O" for clarity. Some examples are:

"O TIME"
"O BAD INPUT"
"O COUNTER"
"O NEXT"

Operator fields used for Counters need to be reset at the completion of a call and prior to an Answer Telephone step for the next caller.

4.2.4.3 Telephone Input Fields

Telephone Input Fields contain DTMF data input by the caller. It is recommended that Telephone Input Field names be preceded by a "T." Some examples are:

"T ACCOUNT NO"
"T AGAIN"
"T SUFFIX"
"T DATE."

4.2.5 Translation Tables

A Translation Table name is subject to the same length and content rules as field names. A prefix is not required, but it is good practice to give a translation table a name descriptive of its use.

Additional material on translation tables has been added in Part 3, Chapter 15.

4.3 Saving Application Outline Training

The development of a VRU Application Training Outline can represent a significant amount of work, and the loss of a fully developed VRU application could have a severe impact on a customer's operations. Consequently, the user is urged to follow a regular backup procedure, maintaining several copies not only of the current Application Outline, but also of the Voice Training, System Files, and Configuration Training Files. Backups should be taken as a first step whenever changes are made, and copies of the previously existing training should be kept for an appropriate period of time in case a problem develops that requires a change to be backed out.

To protect against diskette read problems when attempting to restore data:

- make at least 2 backup copies of each file type (application, voice, configuration)
- keep at least 2 generations of backup diskettes for the application and voice files
- use diskettes with the correct density (High Capacity 5 1/4 inch diskettes for the 9270 Model 01; 3 1/2 inch High Capacity diskettes for the Model 40)

In addition, it should be kept in mind that if a 9270 unit experiences a hardware failure, the entire unit will be replaced. Most of the time it will be too late to take a backup after the unit fails, so the customer should always have current backup copies of all of the 9270 training files available in case a hardware failure occurs and the replacement of the unit is required.

Note: See Training Guideline number 38 on page B-4 for additional information.

4.3.1 Saving to the Hard Disk

The user is encouraged to save the VRU application training file to the hard disk periodically during the process of Application Training. The frequency of the save is up to the user, but the process only takes a few seconds, and the consequences of a power failure or other unexpected event causing hours of work to be lost far outweigh the small investment in time. To save the Application Training Outline and return to the Training Menu, the user should perform the following steps:

1. Return to the Application Training Menu from the Outline
2. From the Application Training Menu, select "Save Training"
3. From the Save Training Menu, select "Save and Suspend Training" or "Save and Accept Training as Complete"

Once the save operation has completed, the user may resume training or select other VRU functions from the Main Menu.

4.3.2 Saving to Diskette

The requirements for maintaining diskette copies of the VRU Training Files can not be overemphasized. To save the Application Outline Training File to diskette, the user should have a formatted diskette available and should perform the following steps:

1. From the Main Menu, select "Utilities"
2. From the Utilities Menu, select "Disk Utilities"
3. From the Disk Utilities Menu, select "Backup Training to Diskette"

Several formatted diskettes may be required to save the Application Training; if the user does not have any formatted diskettes, the option to format diskettes may be selected from the Disk Menu prior to performing the backup operation. It is suggested that several blank formatted diskettes be kept near the VRU to save time in the backup process.

Note: Only diskettes which have the appropriate density and which have been formatted on the 9270/9274 can be used to back up and restore files. Diskettes formatted by PC's or other devices can not be used. The 9270 Model 01 uses the red labeled IBM 5.25 2HC Diskettes, with 96 tracks per inch (IBM P/N 6109660 or equivalent). These diskettes are also referred to as **"High Capacity, double sided soft sectored"** diskettes, and are the same type that are used with the 1.2 MB A-drive on an IBM PC/AT. The 9270 Model 40 and the 9274 use 3 1/2 inch diskettes which are High Capacity 2.0 MB (1.44 MB formatted; IBM P/N 6404078), with 135 tracks per inch.

Warning: The 9270 Model 01 will format a standard Double Density diskette and complete the Backup of data onto that diskette, but the VRU will be unable to Read a Double Density diskette and the Restore will not be successful. **Only High Capacity diskettes can be restored on the 9270 Model 01.**

The Voice Training, System Files, and Configuration Training Files may also be backed up to diskette by selecting the appropriate item from the Disk Utilities Menu.

See Appendix D of this document for an example of the Disk Utilities Menu, and Chapter 7 of the Training and Operations Guide for more detailed information on the use of the VRU Backup and Restore facilities.

Chapter 5. Application Outline Organization

5.1 Application Outline Training Entry Level

The VRU Application Outline is analogous to a "skeleton" program that the user fills in to accomplish the host and caller interaction that is required by the user's particular application. When "Application Outline Training" is selected from the VRU Application Training Menu, the highest level of the Application Outline is displayed. See Figure 5-1 for an example of the entry level Application Training Outline screen.

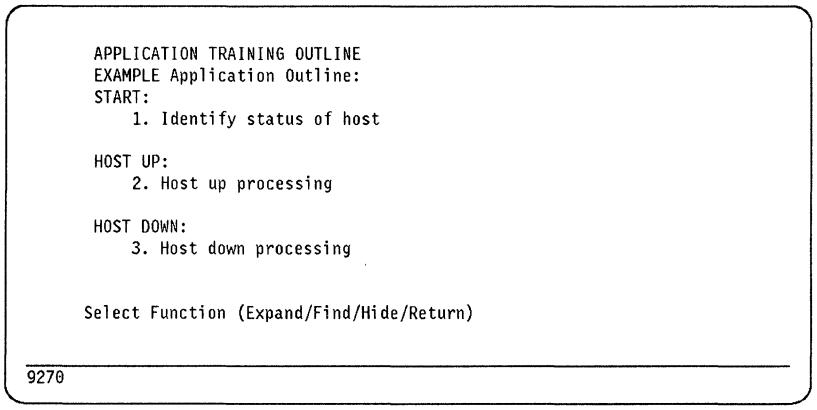


Figure 5-1. Entry Level of Application Training Outline

Note that each step has a label, which is more or less descriptive of its function:

1. The START step always gets control when the VRU is brought on line. It determines whether the host terminal connection is active by examining the operator information area on the 3270 screen along with other indicators of availability. If the host connection is active, control is given to HOST UP; if the connection is not active, control is given to HOST DOWN. Note that an active host connection in itself does not indicate that the desired host application is available - it only indicates that the VRU can communicate with the host. The user will be required to perform whatever steps are necessary to establish a session with the host application under HOST UP processing. The START step is unique in that it can not be expanded, changed, or deleted by the user.

2. The HOST UP step is the section of the application outline under which nearly all of the application logic is contained. By identifying the various screens that can be sent to the VRU and by causing the VRU to perform specific actions for each screen, the user can direct the VRU application to log on, log off, perform error recovery, and interact with callers and the host application to the extent required by the application.

3. The HOST DOWN step receives control when the START step determines that the host connection is not active. HOST DOWN can also be branched to from the HOST UP step if a condition is detected by the application training that indicates that the host connection is not available. Typical HOST DOWN processing will involve answering the telephone, informing the caller that the

system is not available, and either asking the caller to try again later or transferring the call to a human agent.

In the special case of the use of the 9270 VRU with no connection to a host processor (known as the "No-Host Option"), a VRU configuration option is set that causes START to immediately pass control to the HOST DOWN step. In this case, all VRU application processing will take place under HOST DOWN. See the Training and Operations Guide under "No-Host Option" in Chapter 3 for further details.

5.2 Initial Screens Under HOST UP Processing

The concept of "Initial Screen" processing in the operation of the VRU is a very important one. In order for any VRU application to operate properly, it must be organized in such a way that the VRU can recognize the sequence of screens that is presented to it by the host so it can perform the processing required to logon, recover from errors and system outages, and process requests from callers.

When the HOST UP step receives control from the START step, the VRU searches its library of defined screens to see if there is a match between the screen it has read from the host and the screens it has been trained to recognize. If there is a match and the screen name is the same as a screen name in an "Initial CRT Screen" step, the VRU will begin executing application steps defined under that step. If no match is found, the VRU will proceed to the "Process unrecognized or unexpected CRT screen" step, which is always the last step in the Initial Screens Step List. Once processing has been completed for a particular initial screen, the next expected screen should be received via a "Receive expected CRT screen" step and the application should proceed back to START to process the next screen.

Consider the simple host logon process below. It requires a human operator to perform the following actions to log on to an application program and to initiate a transaction:

1. The terminal operator sees a "Welcome" screen from VTAM and knows the host application is available.
2. The operator enters a user ID and password on the "Welcome" screen and then presses ENTER.
3. If the logon is successful, a screen with an application "Logo" is sent to the terminal.
4. The operator presses the CLEAR key to blank the screen.
5. When the screen blanks, the operator enters the transaction name on the blank screen to invoke the particular function desired and then presses ENTER.
6. Once the transaction name has been entered, the operator receives a base "Application" screen from which inquiries are made into the host application.

5.2.1 Initial Screens List

To implement this process on the VRU, each of the screens that the operator would see during the logon process would be defined to the VRU, and the screen name defined for each one would be added to the Initial Screens List as an Initial Screen step. The Initial Screens List will also contain CRT screens that may be received after errors or unexpected situations such as a caller disconnect during call processing. Refer to 4.2, "Coding Conventions" on page 4-1 for CRT screen naming guidelines. The Initial Screens List in the Application Training Outline for the above logon sequence would look like the example in Figure 5-2. The Labels "BASE SCREEN PROCESSING" and "LOGON" have been added to match the sections in Figure 5-3 on page 5-5.

```
APPLICATION TRAINING OUTLINE                    STEP LIST
EXAMPLE Application Outline:
HOST UP:                                    1. Add new initial screen
  2. Host up processing                     2. Insert new initial screen
  BASE SCREEN PROCESSING                    3. Delete initial screen
     1. Initial CRT screen is "APPL"        4. Change name of initial screen
  LOGON
     2. Initial CRT screen is "BLANK"
     3. Initial CRT screen is "LOGO"
     4. Initial CRT screen is "WELCOME"
     5. Process unrecognized or
        unexpected CRT screen


Select step or function (Expand/Find/Hide/Label/Return)
_____________________________________________________________________
9270
```

Figure 5-2. Initial Screens List for Simple VRU Application

5.2.2 Initial Screens Step List

The Initial Screens Step List is displayed to the right of the Initial Screens List, and it contains the processing choices available to the user at this level of the Application Outline.

See Chapter 3 of the Training and Operations Guide for detailed explanation of the function and usage of each step in the Initial Screen Step List.

5.2.3 Initial Screen Processing

The sequence of screens that appears to the VRU, along with the data entered on the screens and the AID or Function Keys sent by the VRU in the Logon process would be identical to the sequence entered by the human operator.

The "APPL" screen, under which the actual caller interaction will take place, is known as the "Base Screen." The Base Screen should always appear first in the Initial Screens Step List. The primary reason for this is that if any modifications are made to the Application Training Outline, they will probably be made in this step since most of the logic is contained here, and this position makes the Base Screen easier to find and more convenient to access. This is particularly true in a large, complex application, since some applications may have several pages of Initial Screens. The Base Screen is the step under which the telephone is answered, caller input is taken, host inquiries and updates are made, and information is spoken to callers. The object of the processing under all of the other

Initial Screens in the Initial Screens Step List should be to either perform part of the process of reaching the Base Screen or to deal with error conditions, such as application unavailability, caller disconnect, or other unusual occurrences. Once the Base Screen has received control, the application should never "Proceed to a label" in another Initial Screen except under exceptional conditions.

Notice that the Initial Screens in the Initial Screens Step List above are in descending order of their appearance in the logon process. This is not required, but there are three reasons for organizing the Initial Screens in sequence like this:

1. The Base Screen should always appear first in the Initial Screens List for the reasons stated above.
2. Having the screens in order of their occurrence in the logon process makes it easier to understand the logic and flow of the application training.
3. Any other screens that may be encountered by the application should appear in descending order of their likelihood of occurrence so that the VRU does not have to spend extra time searching through entries in the Initial Screens List when a screen that appears frequently is received from the host.

As mentioned above, the VRU performs a specified series of application steps to process each screen when it is recognized by the VRU. Using the above logon scenario as an example, when the VRU receives the "Welcome" screen, the logic flow of the VRU application training under the "Initial CRT screen is 'WELCOME'" step would be the following:

1. Enter data on CRT screen: "Logon ID."
2. Enter data on CRT screen: "password."
3. Send CRT screen to host using "Enter" key.
4. Receive expected CRT screen "LOGO."
5. Proceed to label "START" to process the next screen from the host.

If the logon is successful, the "Logo" screen is received by the VRU, the START step recognizes it, and control is passed to the step, "Initial CRT screen is 'LOGO'." The following logic flow would occur under the step, "Initial CRT screen is 'LOGO'":

1. Send CRT screen to host using "Clear" key.
2. Receive expected CRT screen "BLANK."
3. Proceed to label "START" to process the next screen from the host.

Note that the above represents the logic flow only; the actual coding of the Application Outline steps would appear somewhat differently because of the nature of the VRU Application Training Interface.

The remaining screens are processed in a similar fashion, with the overall object of getting to the Base Screen so that the telephone can be answered and calls can be processed. A point to remember is that the VRU can begin initial screen processing at any point in the logon process. For example, using our simple VRU Application scenario, if for some reason the VRU's terminal session was presented with the "Logo" screen as the first screen it encountered, the VRU would

just pass control to the "Initial CRT screen is 'LOGO'" step and follow the sequence of expected screens until the Base Screen has been received from the host. This simple VRU Application has very little error recovery - if an unrecognized or unexpected screen is received, the Outline proceeds to the Host Down label. A logic diagram of the flow of Initial Screen Processing for the above application is shown below in Figure 5-3.

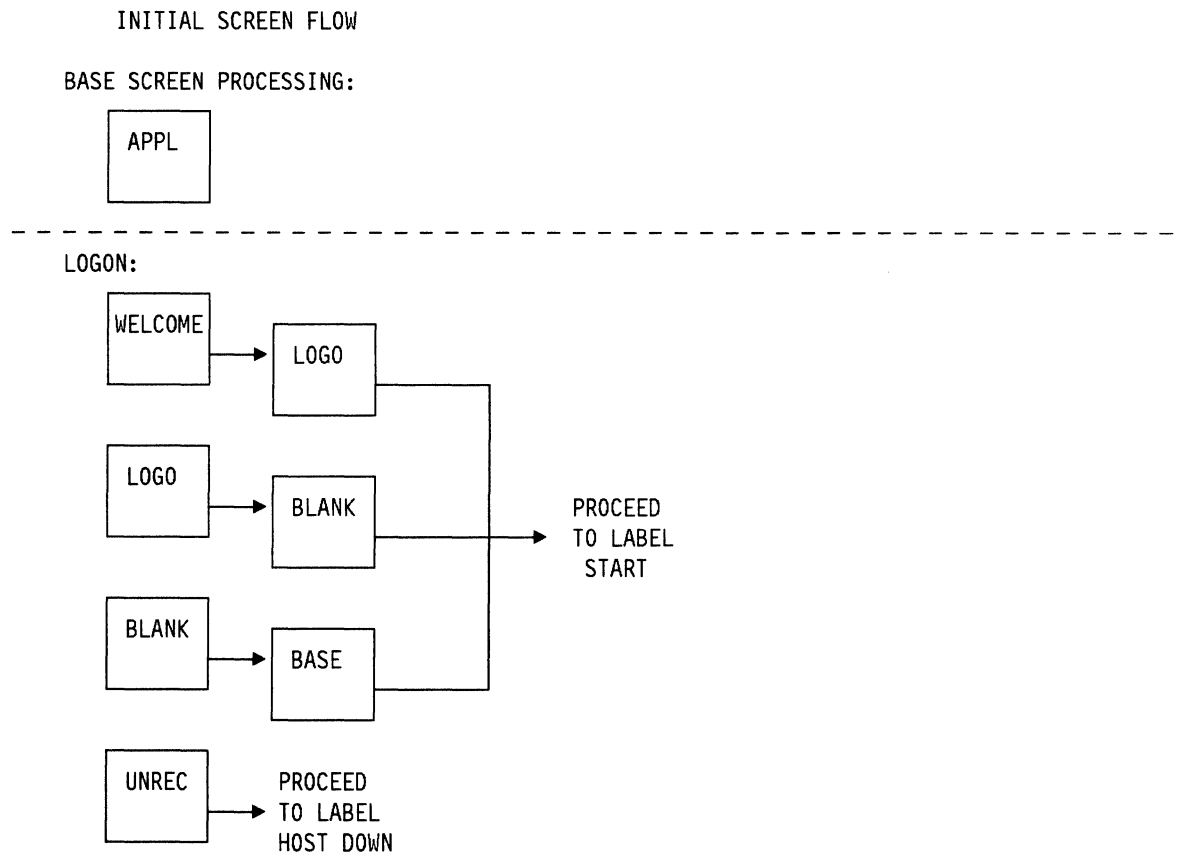


Figure 5-3. Initial Screen Flow for Simple VRU Application.

5.3 Recovering from Errors on the Host

Suppose that in the example logon process above, an error screen is sent to the operator if a logon is attempted when the application is unavailable. The user can train the VRU to recognize the error screen, and can make it an Initial Screen named "DOWN." (See 5.5, "Unrecognized Screen Processing" on page 5-7 for more details on this process.) Now, when this screen is encountered by the VRU, the proper actions can be taken to return the host session to a known state and pass control back to the START step. If the user chose to call this screen "DOWN," the Initial Screens List would look like the example in Figure 5-4 on page 5-6.

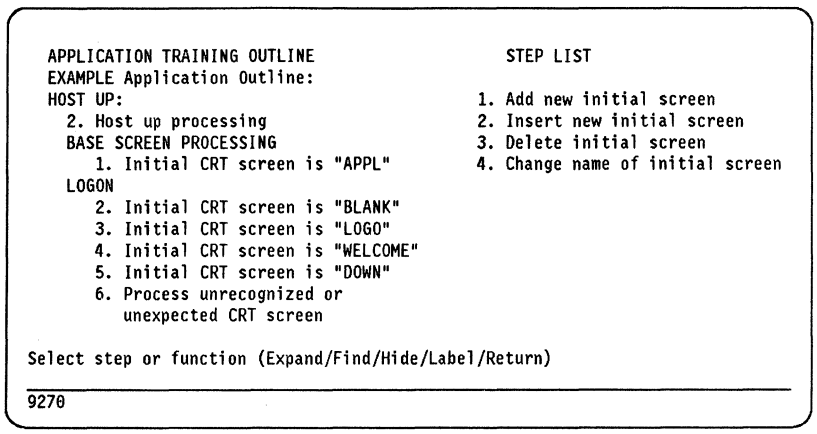


Figure 5-4. Initial Screens List with "DOWN" Screen Added

To recover from this expected but invalid screen and return to the "Welcome" screen to attempt to log on again, the new Initial Screen step could perform the following logical flow:

1. Send screen to host using the "CLEAR" key to get a blank screen.
2. Enter "LOGOFF" on the screen.
3. Send screen to host using the "ENTER" key to perform Logoff.
4. Proceed to START to look for "Welcome" screen.

Note that the above logic will "loop" trying to log on to the application until it becomes available again. If the user finds this undesirable, a pause or a counter may be inserted in the above logic to limit the number of times this sequence will be repeated if the application becomes unavailable.

5.4 Base Screen Processing

As mentioned above, the Base Screen is the section of the VRU Application Training Outline under which most of the caller and host application interaction takes place. Typical activities that might be done under the Base Screen processing include answering the telephone, speaking messages to the caller, receiving telephone input from the caller, speaking host data to the caller, transferring the caller to another extension, and hanging up the telephone. Once Base Screen processing has begun, any number of different CRT screens may be received and processed; the Base Screen just gives the VRU a known starting point to begin processing. (See 6.3.5.1, "Processing Multiple Expected Screens" on page 6-12.) An important point to remember is that Base Screen processing (or any Initial Screen processing) should never proceed to another Initial Screen except to perform recovery and cleanup after an error condition has been encountered.

Another important part of the Base Screen logic is the way in which caller interaction is terminated. There are basically three ways in which a VRU call can end:

1. The caller can indicate to the VRU through a menu choice that the call should end, in which case the VRU can speak a "goodbye" message to the caller, hang up the telephone, initiate whatever cleanup processing is required, and proceed to START to look for the Base Screen and prepare to

answer the telephone again. This is the preferred method of terminating a call since it will take a minimal amount of time to make the telephone port available for another call.

This type of disconnect is logged as a "Module Disconnect" in the VRU statistics report.

2. The caller can hang up in the middle of application processing. If VRU is connected to a telephone switch that signals disconnect via current interruption or dial tone the VRU will detect the disconnection and can proceed to the START Label to perform whatever cleanup processing is required to reset the application and receive another call. If the telephone switch does not signal a disconnect by the above method, it will normally not be detected until input is solicited from the caller and will result in a timeout. If the VRU is connected to a switch of this type, it is important that the "Timeout" step under a "Receive Telephone Input" take this into account and perform whatever cleanup is necessary prior to returning to START. Because the VRU must wait for a timeout and may also retry several times before giving up, it may be a matter of minutes before the VRU can answer another call on the port. The exact amount of time involved will depend on what the user specifies for a timeout interval and the number of retries. If this becomes a problem, the user may find it useful to give the caller the option of ending the call on every prompt for additional input to encourage the caller to allow the VRU to terminate the call. The VRU Statistics Report logs a call that is terminated by the caller as a "Caller Disconnect." The number of "Module Disconnects" can be compared to "Caller Disconnects" so the user can be aware of how VRU calls are being terminated and take steps to correct the situation if there are excessive caller disconnects.
3. The host application can become unavailable during a call. This will be detected when the VRU attempts to send or receive a CRT screen. In this case, the "Host Timeout" step under the "Send CRT Screen to host" or the "Receive CRT Screen from host" step should proceed to a section of the Application Outline that will speak a message to the caller explaining that the application has become unavailable. The VRU application can then either hang up the telephone or transfer the caller to an agent prior to proceeding to START to wait for the host to become available. Then, if necessary it can attempt to reestablish the application session. See 5.6.1, "ERROR W CALL" on page 5-8.

Whatever the call termination method, it is extremely important that the application processing perform the necessary steps involved in getting back to an Initial Screen that the VRU can recognize so that Base Screen processing can resume and another call can be answered. This should always involve making sure that the telephone line(s) are disconnected and the host session is in a known state prior to proceeding back to START.

5.5 Unrecognized Screen Processing

The step that processes Unrecognized or Unexpected screens is always last in the Initial Screens List. The VRU Application Training Interface prevents the user from adding any Initial Screen processing steps after this step. By definition, any screen that is not recognized in a preceding "Initial CRT screen is..." step is an Unrecognized or Unexpected screen and is handled by this step. Each time this step is entered, a message indicating that an Unrecognized or Unexpected screen has been received is inserted before the step in the outline, the on-line

application error counter is incremented, and an image of the screen that was encountered is saved. The user can invoke "Unrecognized/Unexpected Screen Training" to look at the screen. The user may elect to copy the screen image to the VRU's screen image library and define it as a new Initial Screen to be processed appropriately. Normally, there are always a few unanticipated situations that come up in the interaction between the VRU and the host that generate unexpected screens. During the process of application development and testing these screens can be identified and handled using the "Unrecognized/Unexpected Screen Training" facility. As the VRU application matures, it encounters fewer and fewer Unrecognized or Unexpected screens and the application will eventually be able to recover from almost any error situation that occurs during its interaction with the host.

5.6 Additional Steps to Add for Error Recovery

There are two "subroutines" that should be added to the Application Outline under the "Process unrecognized or unexpected CRT screen" step of HOST UP during Application Outline Training. These two "subroutines" are labeled "ERROR W CALL" and "ERROR W NOCALL," and their function is to provide a single place to perform error recovery when an unexpected event, such as a timeout or the receipt of an unexpected screen occurs during Application Processing. There is no requirement that these routines be placed in this location, but since this section of the Application Outline always exists, it is convenient to put them there.

5.6.1 ERROR W CALL

The "ERROR W CALL" routine performs recovery and cleanup when an error is encountered with a caller on the telephone line. The user should ensure that the error recovery steps (for both timeout and unexpected situations) for host and caller interaction contain a "Proceed to label ERROR W CALL" step if there is a call active. Processing under this Label should include informing the caller that an error has occurred while processing his request, and asking the caller to either hold for a transfer to a live agent or to call back later. The step also should perform whatever recovery actions are necessary, including disconnecting the telephone line, and/or resetting the terminal, and should proceed to START to wait for the error condition to be resolved. There is a good example of what kind of processing can be done in this situation in the sample Application Training Outline for "The Company" in Appendix G of the Training and Operations Workbook, under the Label "ERROR W CALL" in HOST UP: Unexpected screen processing.

5.6.2 ERROR W NOCALL

The "ERROR W NOCALL" routine performs a similar recovery and cleanup function when an error is encountered but a call is not active. This usually occurs when processing Initial Screens other that the Base Screen. As above, the user should ensure that the error recovery steps of any processing done without an active call contain a "Proceed to label ERROR W NOCALL" step. Typically, the only recovery processing that needs to be done is a reset or "Turn terminal off/on" prior to proceeding to START to wait for the error to clear. Appendix G of the Workbook also contains an example of this step.

5.7 Complex Application Outline Organization

The sample Initial Screens List below will illustrate the type of organization that should be used with a more complex application that may access several host application screens during caller interaction. This application is also designed to perform the recovery to allow a return to the Base Screen after a call, even if the caller hangs up in the middle of a transaction. The majority of customer applications will use this type of organization. Note that the sample application "The Company" in the Training and Operations Workbook is organized in much the same way.

5.7.1 Sample Complex Application Screen Flow

In this application three screens are required to complete the logon process:

1. The initial VTAM logon screen "LOGO."
2. An intermediate signon screen "SGNON."
3. A final host application entry screen "DONE."

When the "DONE" screen is received, the command to invoke the application is entered to reach the Base Screen.

There are four screens that are used during the processing of caller requests to interact with the host application:

1. The Base Screen, "BASE"nder which the telephone is answered and the application inquiry and update requests from callers are entered.
2. An intermediate application screen, "SCN 1," that might process, for example, a balance inquiry.
3. An intermediate application screen, "SCN 2," that might process a date of entry inquiry.
4. An intermediate application screen, "SCN 3," that might process a request for the amount of the last transaction.

The Initial Screens list for this application would look like the example in Figure 5-5 on page 5-10 below.

```
APPLICATION TRAINING OUTLINE                    STEP LIST
COMPLEX Application Outline:
HOST UP:                                    1. Add new initial screen
  2. Host up processing                     2. Insert new initial screen
  BASE SCREEN PROCESSING                    3. Delete initial screen
     1. Initial CRT screen is "BASE"        4. Change name of initial screen
  RECOVERY
     2. Initial CRT screen is "SCN 3"
     3. Initial CRT screen is "SCN 2"
     4. Initial CRT screen is "SCN 1"
  LOGON
     5. Initial CRT screen is "DONE"
     6. Initial CRT screen is "SGNON"
     7. Initial CRT screen is "LOGO"
     8. Process unrecognized or
        unexpected CRT screen

Select step or function (Expand/Find/Hide/Label/Return)
_____________________________________________________________________
9270
```

Figure 5-5. Initial Screens List for a Complex VRU Application

As in the previous example, the logon process is designed to reach the Base Screen so that the telephone can be answered, and the object of all other screen processing in the Initial Screens List is to get back to the Base Screen.

The "Recovery" section of the outline contains the processing required to return to the Base Screen from "SCN 1," "SCN 2," or "SCN 3" if the connection to the caller is lost during host interaction. This allows the Base Screen to be accessed again quickly so that another call can be answered on the VRU port.

If an exceptional condition, such as an unexpected screen or a host timeout occurs while processing the Base Screen, the application will proceed to Label "ERROR W CALL" to perform the processing as explained in 5.6.1, "ERROR W CALL" on page 5-8 above.

If an unexpected screen or host timeout occurs during LOGON or RECOVERY processing, the application will assume that the Host Processor has become unavailable and will proceed to the HOST DOWN step to perform the specified recovery actions and wait for the Host to become available again.

In addition, if the caller hangs up during the call, the VRU will proceed to Label START when the disconnect is detected. Control will then be passed to the appropriate Initial Screen under RECOVERY to allow the Base Screen to be accessed again.

A screen flow diagram for the above application is shown in Figure 5-6 on page 5-11 on the next page.

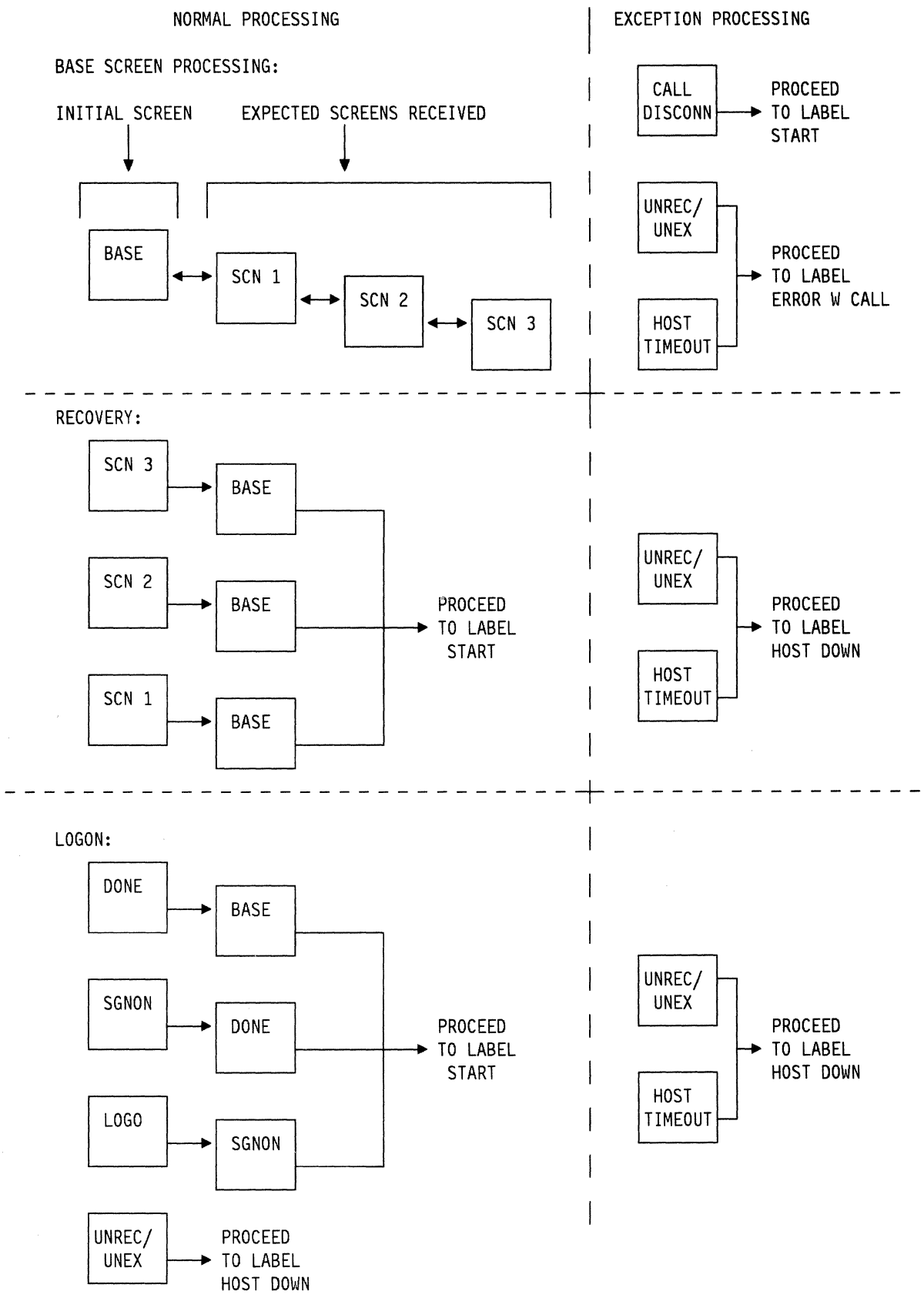


Figure 5-6. Initial Screen Flow for Complex VRU Application

Chapter 6. Coding Application Outline Steps

6.1 Notes on Functions

The user can perform various housekeeping, manipulation, and control processes under Application Training by using VRU Functions. The functions available at any given point in Application Training can vary from screen to screen, and the current VRU Functions that are available are displayed on the bottom of the screen following the words, "Select step or function." This line on the screen is known as the Select Line. In the example in Figure 6-1, the Expand, Find, Label, Hide, and Return functions are currently available to the user.

```
APPLICATION TRAINING OUTLINE                    STEP LIST
EXAMPLE Application Outline:
HOST UP:                                     1. Add new initial screen
  2. Host up processing                      2. Insert new initial screen
     1. Initial CRT screen is "APPL"         3. Delete initial screen
     2. Initial CRT screen is "BLANK"        4. Change name of initial screen
     3. Initial CRT screen is "LOGO"
     4. Initial CRT screen is "WELCOME"
     5. Initial CRT screen is "DOWN"
     6. Process unrecognized or
        unexpected CRT screen

Select step or function (Expand/Find/Hide/Label/Return)
_____________________________________________________________________________
9270
```

Figure 6-1. Example of a VRU Application Training Function List

The full set of VRU functions that are available are: Add, Change, Delete, Expand, Find, Hide, Insert, Label, Move, Next, Return, Save, Split, and Unique. Some of these functions, such as Split and Unique are used in other areas of VRU training and are not applicable within Application Outline Training. Additional capabilities and usage techniques for selected VRU Functions are discussed below. Appendix A of the Training and Operations Guide provides a detailed explanation of the operation of all of the VRU Functions.

6.1.1 Add Function

The Add function adds a new screen to a screen list or a new field to a field list. See Appendix A of the Training and Operations Guide for more details on the use of the Add function.

6.1.2 Change Function

The Change function is used to change VRU Application Outline steps. To invoke the Change function, the user enters "C" or "Change" on the screen, along with the number of a step that is currently displayed on the screen. If no number is entered, the VRU will prompt the user for a step number. If a number is entered that does not appear on the screen, the user will be informed via message. Once the Change function has been invoked, the VRU Application Interface prompts the user through the process of changing the designated step. If a step can not be changed, the user is informed by a message on the screen.

In order to change an Application Outline Label, the user selects the step number of the step containing the Label to be changed. Once the step has been selected, the VRU prompts the user to indicate whether the entire step or just the Label should be changed. The user should ensure that when a step Label is changed, all references to the Label in "Proceed to label" steps are also changed appropriately. References to a Label can be located using the "Find" function to search the Application Outline for references to the affected Label. (See 6.1.5, "Find Function" on page 6-3.) The Application Outline Integrity Check will also flag references to a non-existent Label with an Error message. Failure to correct references to deleted Labels can result in unpredictable results during VRU Application Outline processing.

Selecting a "Make a decision" step as a target of a Change function will result in the entire step being deleted and replaced. If only a part of the "Make a decision" step needs to be changed, the Expand function should be used instead.

6.1.3 Delete Function

The Delete function allows Steps or Labels in the Application Outline to be removed. If a step containing a Label is specified, the user is prompted as to whether just the Label or the entire Step should be deleted. The user should exercise care when deleting Labels, and should ensure that no "Proceed to label" steps reference the deleted Label. In addition, if a Label is deleted from one step and redefined on another step, "Proceed to label" steps that reference the Label may have to be redefined to make them valid again, even though the Label may still appear correct.

6.1.4 Expand and Return Functions

The VRU Application Training Outline is organized in multiple levels, with the highest level being visible on the screen immediately after "Application Outline Training" has been selected on the Application Training Menu screen. Generally, as the user selects or "Expands" lower levels of the outline a "deeper" or more detailed level of Application Outline processing is displayed.

Moving from level to level in the VRU Application Training Outline is accomplished through the use of the VRU Expand and Return functions.

To move down a level in the Application Outline, type "E" or "Expand" followed by a step number that is currently displayed on the VRU training terminal. The Application Training Interface will not allow a step that is not displayed on the screen to be expanded. If a step number is not entered, the VRU will prompt the user for a step number. If the selected step is not expandable, the user is informed by a message on the screen.

To move up one level in the Application Training Outline, type "R" or "Return." Generally, typing "Rn," where "n" is a non-zero number, will return the specified number of levels in the Outline. Entering "R0" will usually return the user to the Application Training Menu. In some situations, for example after adding text to a "Speak A Message" step, the user must return one level before the "Rn" or "R0" short cut is effective.

The Expand function is also used to make changes to "Make a decision" steps. When a "Make a decision" step is expanded, the user is prompted to indicate whether any part of the step should be changed and is given the opportunity to enter the change if desired.

6.1.5 Find Function

Various information, including specific step Labels, references to Labels, field names, application error messages, and integrity check errors and warnings can be located within the VRU Application Training Outline by using the Find function. A particularly convenient use of the Find function is to position a particular step number at the top of the screen to make it easier to work with the Outline. This is accomplished by doing a Find for "A specific outline number in the current outline level." See Appendix A of the Training and Operations Guide for further details on the use of the Find function.

6.1.6 Hide Function

The Hide function is used to hide Application Error and Warning Messages and Conversion Warning Messages from the Application Outline Training list. This process is described in 6.4.1.1, "Finding and Removing Error and Warning Messages" on page 6-13.

6.1.7 Insert Function

The Insert function inserts a step from the currently displayed step list at the specified place in the Application Outline.

6.1.8 Label Function

The Label function adds a Label to the specified Application Outline step.

6.1.9 Move Function

The VRU "Move" function moves a single step at a time from one location to another on the same application training level. See Appendix A of the Training and Operations Guide for further details.

```
APPLICATION TRAINING OUTLINE                1. Answer telephone
EXAMPLE Application Outline:                2. Speak a message
 HOST UP:                                   3. Receive telephone input
   2. Host up processing                    4. Make a decision
      1. Initial CRT screen is "APPL"       5. Proceed to a label
        1. Answer telephone                 6. Move data into an operator field
        2. Speak a message                  7. Enter data on CRT screen
        3. Receive telephone input          8. Send CRT screen to host
        4. Proceed to label MAIN MENU       9. Receive CRT screen
                                           10. Read operator screen
                                           11. Log a record
                                           12. Disconnect telephone line
                                           13. Do telephone signaling
                                           14. Set telephone line state
                                           15. Place a call
                                           16. Count statistics transaction
                                           17. Begin statistics procedure
                                           18. Turn terminal off/on
                                           19. Pause (seconds)
Select step or function (Expand/Find/Hide/Label/Return)
_____________________________________________________________________________
9270
```

Figure 6-2. Main Step List

6.2 Notes on the Main Step List

The Main Step List is displayed on the right side of the operator terminal screen when any step in the Initial Screens List is expanded. The Main Step List contains the processing choices available to the user at this point in the Application Outline. An example of the Main Step List appears on the right side of the screen in Figure 6-2 on page 6-3.

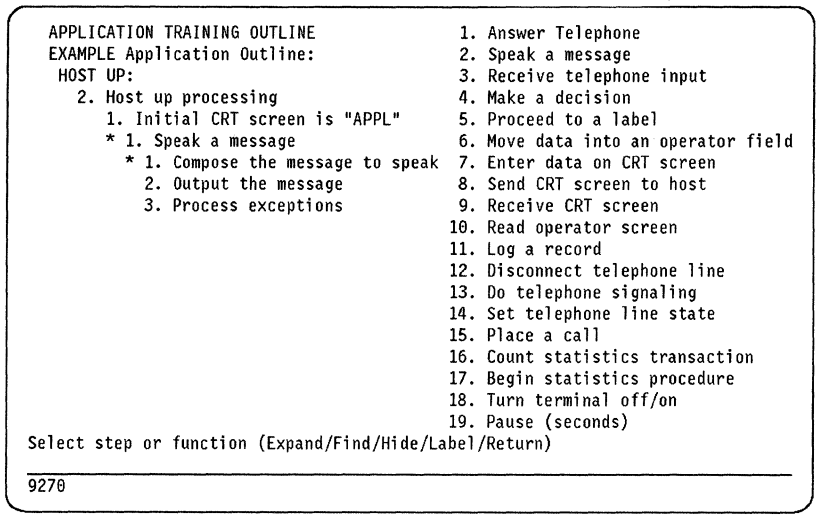


Figure 6-3. Speak A Message Step Expansion

The section below contains additional information regarding the usage and coding of some of the more complex VRU Application Outline Steps. Refer to Chapter 3 of the Training and Operation Guide for further details about the steps in the Main Step List that are not mentioned below.

6.2.1 Speak A Message

The substeps that will be inserted in the Application Outline along with the "Speak a message" step are shown in Figure 6-3.

The asterisk will remain next to the "Compose message to speak" substep until it is expanded and the text of the message is entered.

The VRU has an eight-second limitation on the length of a spoken phrase that can be recorded; this corresponds to approximately two lines of screen input. If a message is longer than this, the "Add" function can be used to add another "Speak phrase" step under the same "Compose a message to speak" step so that the message can be broken into shorter phrases. Alternatively, the "Split" function under Speech Training can be used to break the message into smaller phrases. If the "Split" function is used, the text of the message will remain under a single "Speak phrase" step, but will show up as multiple entries in Speech Training.

6.2.1.1 Considerations When Prompting for Telephone Input

It is important when prompting callers for telephone input to include all the phrases of the prompt under the same "Speak a message" step. If multiple "Speak a message" steps are used and the caller makes an error or aborts the telephone input, the VRU will only reissue the last "Speak a message" step as part of the retry process. This will result in only the last phrase of the prompt being spoken on the retry operation.

```
APPLICATION TRAINING OUTLINE                1. Answer telephone
EXAMPLE Application Outline:                2. Speak a message
 HOST UP:                                   3. Receive telephone input
   2. Host up processing                    4. Make a decision
      1. Initial CRT screen is "APPL"       5. Proceed to a label
        1. Answer telephone                 6. Move data into an operator field
        2. Speak a message                  7. Enter data on CRT screen
        3. Speak a message                  8. Send CRT screen to host
        4. Speak a message                  9. Receive CRT screen
        5. Receive telephone input         10. Read operator screen
        6. Make a decision                 11. Log a record
        7. Proceed to label RETRY          12. Disconnect telephone line
                                           13. Do telephone signaling
                                           14. Set telephone line state
                                           15. Place a call
                                           16. Count statistics transaction
                                           17. Begin statistics procedure
                                           18. Turn terminal off/on
                                           19. Pause (seconds)
Select step or function (Expand/Find/Hide/Label/Return)

9270
```

Figure 6-4. Incorrect Entry of Multi-Phrase Prompt

For example, if the method shown in Figure 6-4 is used to enter a prompt consisting of multiple phrases, all the phrases will be spoken the first time through, but if the caller has to reenter the Telephone Input data, because of an entry error or timeout, only the phrase in the last "Speak a message" will spoken again. This can result in caller confusion and frustration.

```
APPLICATION TRAINING OUTLINE                1. Answer telephone
EXAMPLE Application Outline:                2. Speak a message
 HOST UP:                                   3. Receive telephone input
   2. Host up processing                    4. Make a decision
      1. Initial CRT screen is "APPL"       5. Proceed to a label
        1. Answer telephone                 6. Move data into an operator field
        2. Speak a message                  7. Enter data on CRT screen
        3. Receive telephone input          8. Send CRT screen to host
        4. Make a decision                  9. Receive CRT screen
        5. Proceed to label RETRY          10. Read operator screen
                                           11. Log a record
                                           12. Disconnect telephone line
                                           13. Do telephone signaling
                                           14. Set telephone line state
                                           15. Place a call
                                           16. Count statistics transaction
                                           17. Begin statistics procedure
                                           18. Turn terminal off/on
                                           19. Pause (seconds)
Select step or function (Expand/Find/Hide/Label/Return)

9270
```

Figure 6-5. Correct Entry of Multi Phrase Prompt

To avoid this situation, a single "Speak a message" step should be used containing multiple "Compose the message to speak" substeps as shown in Figure 6-6 on page 6-6.

```
APPLICATION TRAINING OUTLINE
EXAMPLE Application Outline:
 HOST UP:
   2. Host up processing
      1. Initial CRT screen is "APPL"
        1. Speak a message
          1. Compose the message to speak
            1. Speak phrase "Welcome to the example system"
            2. Speak phrase "please enter one to continue"
            3. Speak phrase "or enter nine to quit"









                                          18. Turn terminal off/on
                                          19. Pause (seconds)
Select step or function (Add/Delete/Return)

9270
```

Figure 6-6. Expansion of Correct Method of Entering a Multi-Phrase Prompt

Entering "e2" on the Outline screen in Figure 6-5 on page 6-5 expands the "Speak a message" step to show how multiple "Speak phrase" substeps have been added under the original "Compose the message to speak" step using the "Add" function (See 6.1.1, "Add Function" on page 6-1). This breaks the long prompt into shorter phrases and allows the entire prompt to be spoken again if an input error is encountered. The example in Figure 6-6 shows the multiple "Compose the message to speak" substeps that have been added to the "Speak a message" step.

6.2.2 Speaking Repeating Screen Fields

The "Speak a message" step can speak CRT Screen Fields that have multiple occurrences on one or more CRT screens. When the user enters a screen field name to be spoken in the "Compose a message to speak" substep, a separate "Speak field" substep is added under the "Compose a message to speak" step, as shown in Figure 6-7 on page 6-7.

Also see Chapter 13 in Part 3 of this publication.

```
APPLICATION TRAINING OUTLINE                1. Answer Telephone
EXAMPLE Application Outline:                2. Speak a message
 HOST UP:                                   3. Receive telephone input
   2. Host up processing                    4. Make a decision
      1. Initial CRT screen is "APPL"       5. Proceed to a label
        1. Speak a message                  6. Move data into an operator field
          1. Compose the message to speak   7. Enter data on CRT screen
            1. Speak phrase: account        8. Send CRT screen to host
            2. Speak field: "S ACCT"        9. Receive CRT screen
            3. Speak phrase: is currently  10. Read operator screen
                                           11. Log a record
                                           12. Disconnect telephone line
                                           13. Do telephone signaling
                                           14. Set telephone line state
                                           15. Place a call
                                           16. Count statistics transaction
                                           17. Begin statistics procedure
                                           18. Turn terminal off/on
                                           19. Pause (seconds)
Select step or function (Expand/Find/Hide/Label/Return)
_____________________________________________________________________
9270
```

Figure 6-7. Speak Phrase and Field Substeps of "Speak A Message" Step

To trigger Repeating Screen field processing, the user should expand the "Speak field" substep. A menu similar to the one in Figure 6-9 on page 6-10 will be displayed. If the user specifies the NEXT or PREVIOUS occurrence of the field, it will be marked as a repeating field. Once this is done, Screen Field Training for this screen will contain a prompt to allow the characteristics and location of the repeating field to be defined. The "Make a decision" step also allows repeating Screen Fields to be accessed; see 6.3.1.3, "Accessing Repeating Fields with a Make a Decision Step" on page 6-10 for further information.

6.2.3 Receive Telephone Input

6.2.3.1 Remember the End-User

Remember to keep the telephone input as simple as possible for the End-User. The End-User can be prompted to select an item from a menu with a single digit of telephone input. The VRU can manipulate the input, expand it, use a stored constant or use a Translate Table, if necessary, in order to provide to the host application the character string that it requires. It is recommended that prompts for single digit telephone input not require the terminator # character. Use the terminator # character to terminate input data for fields that vary in length.

Be consistent with the requests for telephone input. If your VRU application speaks back certain data for End-User verification, always request the same telephone input, like "0" for Error in Input or "1" for Input is OK, proceed.

6.2.3.2 Numeric and Alphanumeric Input

Telephone input may be entered in either numeric or alphanumeric mode. The entry of alphanumeric telephone input requires that two keys be pressed consecutively by the caller to enter each character. For details on the alphanumeric telephone entry format as well as the other entry formats available for telephone input data, see Appendix B of the Training and Operations Guide.

Also see Question number 54 in Appendix A, page A-27.

6.2.3.3 Provision for Rotary Telephone Callers

Because the VRU cannot receive input from a rotary telephone, it is good practice to include a "Receive telephone input" step just after the call is answered to screen out callers who might be using a rotary telephone. This can be accomplished by asking the caller (with a "Speak a message") to press a particular key within a few seconds (the timeout interval can be reduced and retries eliminated for this step in the "Process an error" substep of the "Speak a message"); if no input is received, the application assumes a rotary telephone is being used, and can either apologize and explain that a push button telephone is required before hanging up, or it can transfer the caller to an agent. An example of this can be found just under the Label "GET ACCT NUMB" in the sample application "The Company" in Appendix G of the Training and Operations Workbook.

6.3 Make A Decision

The "Make a decision" step is one of the most complex and powerful of the VRU Application Outline steps because it allows the user to detect the existence of Screen Fields, compare the values and lengths of fields and constants, and make decisions based on the results of the comparison.

```
Build the condition you want me to test for in the decision step you
selected using the following table. The condit n is composed of a
selection from columns A, B, C,  and D.

A. IF THIS                B. IS      C. THIS                D. IN
1. Telephone input field  1. <       1. Telephone input field  1. Value
2. Screen field           2. >       2. Screen field           2. Length
3. Operator field         3. < =     3. Operator field
4. Current date           4. > =     4. Current date
5. Current time           5. =       5. Current time
6. Current day of week    6. N=      6. Current day of week
7. Constant                          7. Constant
8. Date                              8. Date
9. Time                              9. Time
10. Screen field exists
11. Screen field does not exist

                          Select A  1/2/3/4/5/6/7/8/9/10/11/R


IF (?)

9270
```

Figure 6-8. Make A Decision Step Selection Menu

When "Make a decision" is selected from the Main Step List, the user is presented with the selection menu shown in Figure 6-8. Using the selection numbers in this menu, the user is prompted through the process of building the logic of the decision step.

The usage of the "Make a decision" step is documented in Chapter 3 of the Training and Operation Guide, but there are several important capabilities of the

"Make a decision" step that need further explanation. These capabilities are the ability to compare both field values and field lengths, the ability to detect the existence or non-existence of a screen field, and the ability to trigger the processing of multiple occurrences of a screen field.

Note that changes to parts of a "Make a decision" step are made with the Expand function, while the Change function requires the reentry of the entire step. See "Change function" and 6.1.4, "Expand and Return Functions" on page 6-2.

6.3.1.1 Comparing Field Values and Field Lengths

Under item D in the selection menu, the user can choose to do a comparison of either the Value (1) or Length (2) of a field. There is an important difference in the way in which the constant is entered to accomplish these two types of comparisons:

1. When comparing a field value to a constant, the condition is true if the field value is equal to the constant, and the specified action will take place. If the user wants to determine whether a numeric field is equal to the value "5," all that is required is that a compare be made in value to a constant defined as "5."

   For example, the statement below will cause the application to proceed to step XYZ if Screen Field "S ACCT" is equal to the constant 5:

   IF screen field S ACCT = Constant (5) in value then proceed to label XYZ

2. When comparing field lengths, however, the process is not so straightforward. If the user wants to determine whether a field is 5 characters long, a compare must be made between the field and the length of a constant defined as "xxxxx...," where "x" is any digit. In this mode the length of the fields are significant, not the values.

   For example, the statement below will cause the application to proceed to step XYZ if the Screen Field "S ACCT" is five characters in length:

   IF screen field S ACCT = Constant (11111) in length then proceed to label XYZ

6.3.1.2 Detecting the Presence or Absence of a Screen Field

An extremely useful capability of the "Make a decision" step is the ability to take an action based on the existence or non-existence of a specific Screen Field. This capability is invoked when items (10) or (11) are selected from the "Make a decision" menu when it is initially displayed (See Figure 6-8 on page 6-8). When these items are selected, the additional menu shown in Figure 6-9 on page 6-10 is displayed.

```
1. Appears once on the screen
2. Repeats, the NEXT occurrence applies
3. Repeats, the PREVIOUS occurrence applies
4. Return to application outline

Choose the selection that applies to this screen field

Select (1/2/3/R)

9270
```

Figure 6-9. "If Screen Field Exists" First Level Menu

Notice that in addition to specifying a single occurrence of the target field, the user can also specify whether the field repeats on the screen. This is another important capability of VRU application processing, and the methods of accessing and defining a repeating Screen Field are discussed below in 6.3.1.3, "Accessing Repeating Fields with a Make a Decision Step."

The remainder of the "Make a decision" step is entered normally as it is documented in Chapter 3 of the Training and Operations Guide.

When a "Make a decision" step is used to determine whether a field exists or not, no other logical operations can take place under that step; an additional step should be created to do a comparison in value or length once a field has been determined to exist, if this is necessary.

```
Should I look for the FIRST "N", the LAST "N",
or ALL the NEXT occurrences of Field xxxxxx?

1. The FIRST "N" NEXT occurrences
2. The LAST "N" NEXT occurrences
2. ALL of the NEXT occurrences
R  Return to the application outline

Please enter selection (1/2/3/R)

9270
```

Figure 6-10. "If Screen Field Exists" Second Level Menu

6.3.1.3 Accessing Repeating Fields with a Make a Decision Step

There are two ways of defining a repeating CRT Screen Field to VRU Application Training: The field can either be defined as a repeating field under a "Make a decision" step, or it can be defined as a repeating field under a "Speak a message" step. If the user specifies that the target Screen Field is a repeating field in the menu shown in Figure 6-9, an additional menu is presented, similar to that shown in Figure 6-10. The reference in the menu to NEXT or PREVIOUS will depend on which choice was made from the prior step. Once the specific field to reference has been defined, the user will be able to update Screen Field Training with the specific location and characteristics of the repeating Screen Field. The definition of repeating Screen Fields is further discussed in "Screen Training."

6.3.2 Proceed To A Label

6.3.2.1 Considerations When Changing Labels

As mentioned above under VRU Application Functions, the user should exercise caution when changing or deleting Labels, and should always be sure that any "Proceed to a label" steps are modified accordingly. If the VRU Application Training detects a problem with a Label in a "Proceed to a label" step, it will mark the step with an asterisk and will also generate an error during the Application Integrity Check.

```
APPLICATION TRAINING OUTLINE                1. Answer Telephone
EXAMPLE Application Outline:                2. Speak a message
 HOST UP:                                   3. Receive telephone input
   2. Host up processing                    4. Make a decision
      1. Initial CRT screen is "APPL"       5. Proceed to a label
       *1. Move data into an operator field 6. Move data into an operator field
         *1. Source of data to enter        7. Enter data on CRT screen
          2. Operator field name            8. Send CRT screen to host
                                            9. Receive CRT screen
                                           10. Read operator screen
                                           11. Log a record
                                           12. Disconnect telephone line
                                           13. Do telephone signaling
                                           14. Set telephone line state
                                           15. Place a call
                                           16. Count statistics transaction
                                           17. Begin statistics procedure
                                           18. Turn terminal off/on
                                           19. Pause (seconds)
Select step or function (Expand/Find/Hide/Label/Return)
_____________________________________________________________________________
9270
```

Figure 6-11. "Move data into an operator field" substeps

6.3.3 Move Data Into An Operator Field

Another powerful capability of the VRU Application Outline steps is the ability to logically or mathematically manipulate Telephone, Screen, or Operator Field data. This is done using the "Move data into an operator field" step.

6.3.3.1 Modifying Data

Access to the VRU Application field modification capability is gained by first selecting "Move data into an operator field" from the Main Step List. Application Training will insert the steps shown in Figure 6-11 in the specified location in the Outline. The user then expands on the "Source of data to enter" substep, specifying the source as either a modified Screen Field, Telephone Input Field, or Operator Field. The "Modified Data Step List" shown in Figure 6-12 on page 6-12 is then displayed. The operations that can be chosen from this step list allow extensive manipulation of VRU fields. For additional information on field formats as used in VRU Application Training, see Appendix B of The Training and Operations Guide.

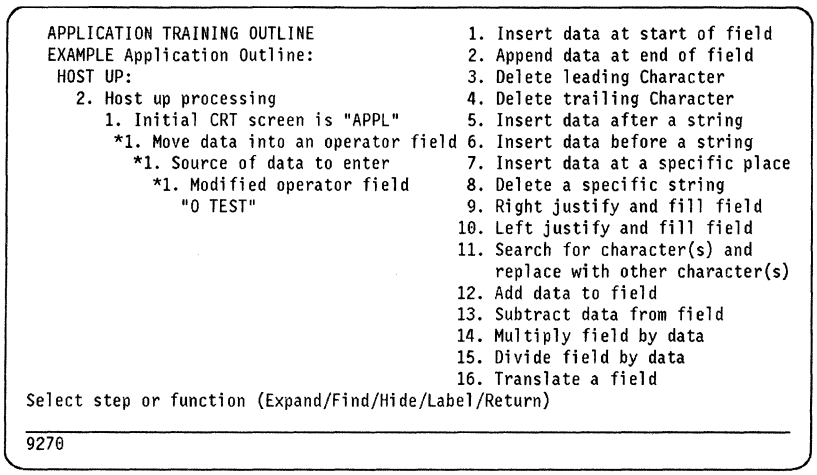


Figure 6-12. Modify Data Step List

6.3.4 Send CRT Screen To Host

The "Send CRT screen to host" step allows the VRU application to send data entered on the CRT screen to the host. This is done using 3270 AID (Attention Identifier) keys.

6.3.4.1 3270 AID Keys Supported

An AID key is a 3270 key that causes the 3270 terminal to communicate with the host. The VRU supports a full range of 3270 AID keys, including Enter, Clear, and all Program Function Keys (PF Keys). A complete list of all the supported 3270 AID keys is contained in Appendix D of the Training and Operations Guide.

6.3.5 Receive CRT Screen

6.3.5.1 Processing Multiple Expected Screens

Multiple expected CRT Screens can be processed under a single "Receive CRT Screen" step simply by adding additional "Process Expected Screen" steps with the "Add" function as shown in Figure 6-13 on page 6-13. Multiple screens are processed under the "Receive CRT Screen" in the same way initial screens are processed in the Initial Screens List - if a received screen matches an expected screen, that step is passed control by the application outline. If no screens are recognized, the "Process Unexpected/Unrecognized Screen" step gets control.

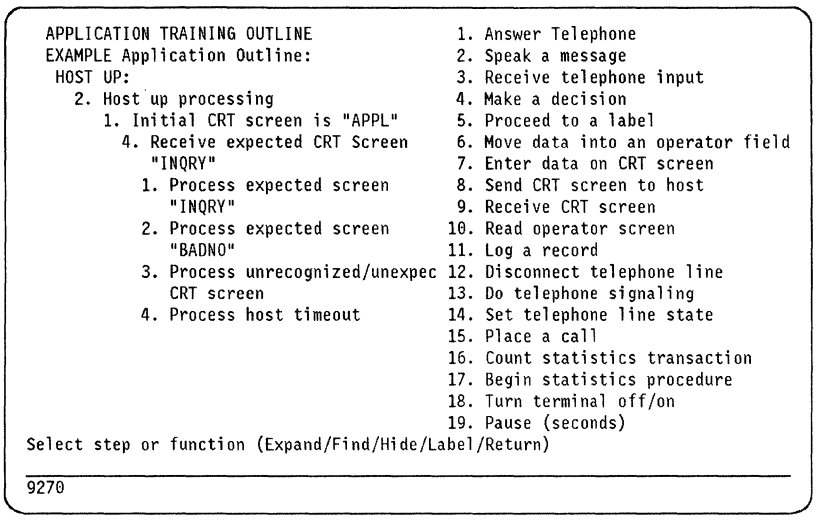


Figure 6-13. Processing Multiple Expected Screens

For information on manual and automatin Paging, see Part 3, Chapter 14.

6.4 Application Training Integrity Check

The VRU Application Training Interface contains a facility known as the "Application Training Integrity Check." The Integrity Check scans the Application Outline statements and inserts "ERROR" and "WARNING" messages to call attention to situations within the Application Training that may cause problems when the application is brought online. The Application Integrity Check is run automatically when Save Training as Complete is selected from the Save Training Menu, and it can also be run at any time by selecting it from the Application Training Menu. If errors or warning messages are generated by the Integrity Check, the user is notified, and the option of continuing or returning to the Training Outline is offered. The existence of errors does not prevent the Training from being saved as complete if the user wants to save it, but running an Application Outline with errors may cause unpredictable results. In addition to informing the user of the number of errors and warnings encountered, the Integrity Check facility also inserts messages indicating the type of error or warning just above the steps in the Application Outline that have generated the error or warning messages.

6.4.1.1 Finding and Removing Error and Warning Messages

Once the situations pointed out by the error or warning messages have been corrected, the user may either rerun the Integrity Check to remove the messages, or the "Hide" function can be used to remove the messages when the problem has been corrected. A convenient way of doing this is to use the "Find" function to position the screen at an error or warning message, and then to use the "Hide" function to erase the message. Note that the error message appears directly above the step it applies to.

Chapter 7. Screen Training

7.1 Screen Identification Methods

As mentioned in the discussion of Initial Screen processing, the ability of the VRU to recognize screens presented to it by the host and to process those screens appropriately is the key principle of VRU operation. The Screen Training section of the VRU Application Training Interface allows the user to define all the screens that may be encountered by the VRU. This definition may be done either through interaction directly with the host application, or the screen images may be entered by the user by modifying a previously saved screen or a blank screen.

The VRU can use three ways to identify a screen sent to it from the host. The method used will depend on the characteristics of the screen as received by the VRU.

Note: When you identify a screen, the label or field chosen must be unique to that screen. Pick something that doesn't appear on any other screen; otherwise the VRU will report an Ambiguous Screen.

7.1.1 Identify By A Fixed Label

The screen can be identified by a "Fixed Label," which is created when the screen is defined to the VRU. This method should only be used when a particular screen always contains a completely unique string of characters that identifies it. When this method is used, the VRU defines a Screen Field called "Screen Label" under the Screen Entry and the user can specify exactly what the field should contain in order to identify the screen.

7.1.2 Identify Using Required Fields

The screen can be identified using two or more "Required Fields" **that only occur on that particular screen**. This can be used to identify screens that may contain the same data except for a few key fields. When the user selects this method of Screen identification, the fields are not automatically defined by the VRU. The user must define the fields and identify them as Required Fields. See Chapter 3 of the Training and Operations Guide for details on the process of defining Required Fields. To avoid confusion, it is suggested that a consistent format be used to name Required Fields, such as "S LABEL 1," "S LABEL 2," "S LABEL 3," and so on (See 4.2.4.1, "Screen Fields" on page 4-2 for more information on Screen Field Names). Once the fields have been defined and designated as Required Fields to Screen Training, a particular screen will be recognized only if the fields match the Required Fields exactly. If the application has several screens that contain similar fields and they are identified using Required Fields, care should be taken to define the fields in the same order under each Screen. If they are not in order, the VRU may not always be able to identify all of the screens.

7.1.3 Identify Because Screen is Blank

Normally, only one screen is defined as blank under Screen Training. If more than one blank screen is defined, the Application Outline Integrity Check (See 6.4, "Application Training Integrity Check" on page 6-13.) generates an "Ambiguous Screen Identification Method" error message for each of the blank screens.

7.2 VRU Screen Identification Logic

When the VRU receives a CRT Screen from the host, it compares each Screen Label and Required Field to the received screen. If an exact match is found, the screen is identified and an "Initial CRT screen is.. " or "Process expected CRT Screen..." step will receive control. If no match is found, the screen is an "Unrecognized or Unexpected" screen and the appropriate steps are invoked to process it.

7.3 Ambiguous Screen Identification

The "Ambiguous Screen Identification Method" error message means that the VRU has found two screens with different Screen Names in its library of saved screens that can be identified by the same Screen Label or Required Fields, or are defined as blank screens. This can be corrected by changing the Screen Label, changing the screen identification method to Required Fields, or adding more Required Fields to ensure that the screens can be **uniquely identified**.

7.4 Unique Function

The "Unique" function can be used in Screen Training to verify that the method of Screen identification chosen produces a uniquely identifiable screen. The function may also be used after an "Ambiguous Screen Identification Method" error message to cause the VRU to list the names of the screens that are ambiguously defined.

7.5 Repeating Fields

The processing of repeating screen fields by the VRU is triggered by defining the field as repeating in a "Speak a message" or a "Make a decision" step as discussed in 6.2.2, "Speaking Repeating Screen Fields" on page 6-6 and 6.3.1.3, "Accessing Repeating Fields with a Make a Decision Step" on page 6-10. When a repeating field is defined, Screen Training prompts the user to define the characteristics and format of the repeating field under the definition of the affected screen.

For additional information on Repeating Fields, see Part 3, Chapter 13 in this publication.

Chapter 8. System Test

The VRU System Test option allows the user to test the VRU application before putting it online to the host. Various selectable options allow the level of testing to progress from step-by-step execution using simulated input and output to full interaction with the host and telephone. The System Test Option is documented in Chapter 5 of the Training and Operations Guide.

8.1 Recommended Approach to System Test

When initially testing a VRU Application, the "Accept input from terminal, output to terminal only" option should be specified and "Y" should be responded to the prompt to pause after each screen. If this is not done and a loop condition exists in the Application, a power off and on of the VRU may be required to recover from the loop. Once the application has been run successfully in this basic level of test, higher levels of test may be selected to perform progressively more realistic testing of the application.

8.2 Monitoring the System Test

With a single console coax attached to the 9270 or 9274, you can monitor any VRU session during the system test without moving the coax cable. You will be prompted to specify which session you want to monitor. You can also enable or disable various telephone lines on the VRU to force a call to a particular port or session.

You can monitor the progress of the application by inserting additional steps to be used during the system test process. These additional steps may include Log Record steps to record activity on the printer or Speak a Message steps so that you can identify paths taken by the application or to reveal the results of modified fields or the output of a translation table, etc. After the system test is complete, the additional steps used to debug the application can be removed.

Part 2, VRU Calling

About Part 2 of the Technical Bulletin

Part 2 describes calls that the IBM 9270 Voice Response Unit (VRU) can transfer using the IBM Computerized Branch Exchange (CBX) switch capabilities and VRU application outline steps. You can extend the VRU application steps described in this document to some other private branch exchange (PBX) vendor equipment with proper modification of the outline.

Note: The VRU has three models: models 01, 40, and 80. Usage of the term "VRU" in this document refers to all models, except where noted.

Part 2 is divided into two Chapters: Basic Call Transfer and Outbound Calling. Chapter 9, "Basic Call Transfer" on page 9-1 describes calls transferred from the VRU to an extension, most frequently to an Automatic Call Distribution (ACD) agent. Chapter 10, "Outbound Calling" on page 10-1 discusses calls originated by the VRU and frequently targeted to off-net (business and residential) telephone numbers for notification applications.

Chapter 9. Basic Call Transfer

The purpose of Part 2, VRU Calling is to describe IBM 9270/9274 Voice Response Unit (VRU) call transfer techniques. The call transfer process is simple. Recovering from call failures is complex and is handled by the VRU through exception processing.

The VRU performs all analog call placement and transfer operations in the same manner as a plain analog telephone. To validate any of the VRU solutions provided, the reader can imitate the actions using a standard telephone (2500 set).

The basic steps to develop the VRU application outline for call transfers are:

- Define a successful call transfer.
- Decide how to recover if the call transfer fails.

The VRU can quickly connect the caller to a transferred extension if it does not monitor for negative events. The VRU quickly disconnects the line during the transfer process, allowing the Computerized Branch Exchange (CBX) to connect the caller's voice path to the target extension. When the target called party answers, the caller will be ready to talk. When you use fixed sets of target extension numbers and properly configured CBX target extensions, many call failures are so unlikely that recovery methods are not justified.

For some VRU implementations, the application designer may want to recover a caller from the rare unsuccessful call transfer (blind transfer with recovery). The designer often has to trade off between transferring a caller to a target agent quickly and allowing enough time during transfer to detect call progress tones. Some call progress tones indicate that the transfer will fail (busy or error tone) and others (ringing tone) indicate that the transfer will most likely succeed. Potential failures are error tone, busy tone, ring-no-answer condition, a PhoneMail® message, fast-busy tone, and miscellaneous tones.

Trying to detect failures can add a few seconds to the connection time between caller and called party. Consequently, in some ACD applications it is advisable to have the VRU transfer calls to a dummy queue before being assigned to a human agent queue.

If the application designer wants to confirm that the caller reaches the called party, the VRU can stay connected to the called party until that party accepts the call (screened transfer). The VRU then disconnects the line, thereby telling the CBX to connect the caller to the called party.

9.1 Agent Call Transfer

The Automatic Call Distribution (ACD) feature of the CBX or private branch exchange (PBX) is widely used for VRUs. The following paragraphs describe a standard call transfer and alternatives used for ACD operations.

® PhoneMail is a registered trademark of International Business Machines Corporation.

A person can transfer a caller to an ACD agent or to an agent queue by dialing the appropriate number and hanging up. The transfer steps are hook flash *7, dial the extension, and hang up. The timing of the disconnect (hanging up) from the last digit dialed is important. If the transferring party hangs up too soon, the CBX calls back the person with the caller online. The CBX performs specific software processing before allowing transfer to take place. This processing occurs within a second or two after the transferring person dials the last extension number digit.

A person or VRU needs to know when to execute the step that signals the CBX to connect the caller to the transfer target extension. A person transfers a call to a target extension and stays on the line until an auditory event indicates to that person that the call transfer is a success. The auditory event could be the first ringing sound, the ACD queue message, or an actual human answer. Any one of these events would indicate to the transferring person that the call transfer was successful.

Failure to reach any of the auditory events that indicate success can cause the transferring person to try to recover the caller, and offer the caller other options. If the person has not disconnected the line, he can recover the caller by using a feature code (hook flash *1) or a connect button.

If the person disconnects the line *before* hearing any progress tones (but after the short delay required by the CBX), the caller hears error, ringing, or other call progress tone. If the person disconnects the line *after* hearing ringing, he knows that the caller did not receive error, busy, or fast-busy tone, so call recovery will not be required. The caller hears ringing and then voice (if answered). The transferred call *might* still end up on an ACD queue with the caller hearing music.

Call transfers require simple CBX configuration setups and human interaction to provide call recovery from the start of transfer to the receipt by the target person. As discussed in the next section, VRU transfers differ from human transfers in key ways: the VRU requires at least 2 seconds to respond to call progress tones (as opposed to instantaneous recognition). Unlike the ACD agent who waits for a voiced "Hello," the VRU requires more positive acknowledgement in the form of a dialed digit, or absence of ringing.

9.2 Screened Transfer

The transferring person may feel that he cannot release the caller until he is sure the caller connects to someone. In this case, the transferring person remains on the line until he hears the target person's voice (and usually says to that person "I have a call for you"). The transferring person disconnects the line, letting the target person and caller speak. This last example is a *screened transfer*.

A screened transfer is one in which the VRU waits for the telephone or extension to be answered. This usually includes telling the person who answered that a call is being transferred to him. Then the VRU disconnects the line.

If you want the caller to be transferred to an answered telephone, the VRU must determine when an extension has been answered. The CBX does *not* provide answer supervision to analog telephones. Therefore, the VRU must determine

when a call has transferred successfully by detecting telephone tones or their absence.

9.3 Blind Transfer

If you do not care if the target extension answers the transferred call, the call is a *blind transfer*. A blind transfer is one in which the VRU transfers the caller to the target extension and disconnects the line almost immediately, telling the CBX that it should connect the caller to the called extension. The next sections discuss blind transfer without recovery and with recovery.

9.3.1 Blind Transfer without Recovery

The following sections describe the steps to perform blind transfer without recovery.

9.3.1.1 Do Telephone Signaling

You use the VRU application outline step called Do Telephone Signaling to handle the transfer process, using a sequence of substeps with their own parameters for timing and for recovery. The process is as follows:

1. Notifies the CBX that it wants to take an action by doing a hook flash on the primary line. This places the caller on hold. The caller hears music if the CBX is configured to offer it.
2. Listens for confirmation (dial tone).
3. Dials feature code *7 requesting call transfer.
4. Dials the transfer extension number digits.
5. Disconnects the telephone line.

The VRU disconnects the line using the Disconnect step after an appropriate delay. The CBX connects the original caller to the transfer extension, and the VRU is ready for the next call.

9.3.1.2 VRU Call Transfer Outline Steps

This section discusses basic call transfer using the following VRU application outline steps (substeps of Do Telephone Signaling). These are required for the simplest form of transfer, in which the call is considered successful if the caller is not arbitrarily dropped or if he hears an error tone.

- Hook Flash
- Listen for Dial Tone
- Dial
- Dial
- Disconnect.

The following sections describe these substeps in detail.

9.3.1.3 Hook Flash: Request for Service

As an example, assume that the VRU has answered a caller and that either the caller, the VRU application, or the host has determined that telephone action is required. In most cases this means transferring the caller to a target extension. To invoke a feature request to the CBX, the VRU must do a hook flash.

The hook flash is a momentary disconnect of the analog line, just long enough to indicate to the CBX that the signal is a request for feature access and is not a true line disconnect. For the CBX, this hook-flash time is usually set to 500 milliseconds (ms). The application outline steps appear as follows:

```
Do Telephone Signaling
   Hook Flash  ( 500ms,Primary )
```

9.3.1.4 Listen for Dial Tone

The CBX responds to the hook-flash request with dial tone. Any digits you want to send to the CBX come after this tone, not before it. This wait is short, but essential. The VRU application outline steps carry out this process with the Listen for Dial Tone step. You can set this wait for any length, usually 5 seconds, although the dial tone should occur within 1 second.

The application outline now appears as follows:

```
Do Telephone Signaling
   Hook Flash
   Listen for Dial Tone (5 seconds)
```

Now the CBX is ready to receive extension- or feature-code digits.

9.3.1.5 Dial: Feature Access Request Digits

After the hook-flash request for service, the CBX waits for the access code that tells it what feature is being requested. For example, on the CBX 8000, 9000, and 9751, the access code *7 indicates a request to transfer a call. Always check with your switch support personnel to see if codes are appropriate and try them out with an analog telephone first.

The VRU application step used for dialing digits is Dial. You send each digit, one at a time, with pauses between digits called the "interdigit time-out." The typical CBX interdigit time-out is 78 ms. It is sometimes useful to start with a setting of 100 ms when you first test the system, then shorten it up to 78 ms after you have been successful. This covers situations in which the switch may be slow due to call volume or other performance factors.

The application outline steps now appear as follows:

```
Do Telephone Signaling
   Hook Flash
   Listen for Dial Tone
   Dial  ( 78 ms, access code digits )
```

The CBX acknowledges the request by sending a tone on the line. You do not usually need to wait for this acknowledgement tone or listen for it before sending any other required digits.

The IBM Redwood® CBX does not require an access code to transfer a call; therefore, you use the Dial step only to dial the extension number.

® Redwood is a registered trademark of International Business Machines Corporation.

9.3.1.6 Dial: Extension Number

Call Transfer: The Dial step for sending the extension number to the CBX is the same as for the access code digits. The same interdigit timing methods and settings apply. The interdigit time-out might be longer for the extension number digits than for the access code, because of the number of digits being sent all at once. The switch might not handle too high a sending rate under heavy traffic load if the digit sequence is long. Some situations may require you to use the Pause step between the off-net access digit 9 or on-net access digit 8 and the digits that follow them.

Note: This could be an off-net number, not an extension.

Dial is a simple step. You dial the digits, using 78 ms interdigit time-out:

```
Do Telephone Signaling
   Hook Flash
   Listen for Dial Tone
   Dial (access code)
   Dial (extension number, 78 ms, Primary line)
```

Transfer Numbers: The transfer number can be a local extension number, a network number, or an off-net telephone number. It cannot be another access code. Example telephone number formats follow:

```
Local Extension    xxxxx or xxxx or xxx
Tie Line           8 RNX XXXX
Local Off-net      9 NNX XXXX
Long Distance Off  9 NPA NNX XXXX
```

Special cases of dial tandem networking might require the VRU to detect dial tone, and then send access digits, repeating this process several times until you reach the target switch and extension. These networks are fast disappearing, but the capability is within the VRU.

Nothing prevents the extension number from being a PhoneMail box (voice messaging), an ACD hunt group number, or a recording. However, each of these conditions require special handling after the extension number is dialed.

The source of the extension number might be caller input, pre-canned numbers in the VRU application outline, or a number on a host application screen. The VRU allows you to insert, delete, and otherwise modify the number and order of digits in the extension number.

9.3.1.7 Disconnect

The CBX connects the caller to the target transfer extension when the transferring VRU disconnects the line. The transfer occurs less than 1 second after the VRU disconnects.

Disconnecting too soon after outpulsing the last target extension number can cause the transfer to fail and the caller to ring back to the VRU automatically. The VRU thinks you made a mistake because you did not check to see that the transfer went as far as the first ring or trunk access noise before the disconnection. This can be particularly confusing for the caller, because the VRU sends the caller back up to the first greeting as if it were a new call.

The solution is to pause before the disconnection. The Disconnect step has an option allowing a configurable pause before disconnection. The option is to set to 3 seconds for this type of blind, no-recovery transfer. It may need to be longer for a network call or off-net call transfer.

Disconnect also may need to be shorter if the call transfer is to an extension in the same switch. The target called party can answer quickly (auto-answer an ACD agent) and the VRU has not disconnected. Therefore, the target called party hears a second or two of silence. A shorter disconnect pause is required in this case. You must experiment.

The success of a blind, no-recovery transfer is limited. If the call transfer reaches an error tone or do-not-disturb (DND) tone and the VRU disconnects the line, the CBX calls it back because it appears to the CBX as a failed call attempt. The VRU does not offer good options to recover or prevent this event, except for those in section 9.3.2, "Blind Transfer with Recovery" on page 9-8.

The application outline steps to complete call transfer now are:

```
Do Telephone Signaling
    Hook Flash
    Wait for Dial Tone
    Dial
    Dial
    Disconnect  (3 seconds, Primary,)
```

9.3.2 Blind Transfer with Recovery

Blind transfer with recovery is one in which the VRU transfers the caller to the target extension and disconnects the line only after the VRU has determined that the call has gone to a ringing telephone. The VRU uses the Wait for Answer step to determine this.

Recovery is the action the VRU takes to reconnect to callers on hold and offer them alternative options when a transfer could not be completed.

The VRU uses tone detection hardware to do call progress monitoring for error, busy, fast busy, and ringing tone indications of the call state. The detection works by measuring energy in certain frequency band groups and analyzing the cadence (on and off timing of tones).

Recovery methods need your special consideration and attention to detail, because they reflect your telephone call processing objectives. The following VRU steps are designed to meet these objectives, and require your thorough understanding of the application and switch environment:

- Wait for Answer
  - Detecting an Answered Call
  - Exception Processing
  - No One Answered
  - Busy Tone
  - Fast Busy Tone
  - Line Did Not Ring
  - Primary Line Disconnect.

The next sections describe the preceding steps in detail.

9.3.3 Wait for Answer: The Step

To determine if a call needs to be recovered, use the VRU application outline Wait for Answer step to detect call progress tones. You use this substep of Do Telephone Signaling right after dialing the target destination number.

The following sections discuss the Wait for Answer answer supervision and exception processing steps.

9.3.4 Wait for Answer: Detecting an Answered Call

Use the Wait for Answer step in Do Telephone Signaling to detect ringing and the end of ringing. If a line rings, and then stops ringing, you might think that the transfer target extension has answered. If the target telephone has not been forwarded to the PhoneMail system (or a similar condition), you are correct, the call has been answered.

9.3.4.1 The Answered Call: Line Ringing and Ring Stopping

The VRU recognizes old and new bell precise ringing tones. About 4 seconds after the end of the last ring tone, the Wait for Answer step determines that the call must have been answered because the ring tone has stopped. The transferred call has been answered and the VRU then processes the next application outline step, such as Disconnect. This causes the VRU to disconnect the line and let the caller talk to the party at the target extension.

9.3.4.2 Wrong Number Recordings, Modems, Fax, Network Announcements

A ring precedes some messages that a caller reaches. For example, a ring precedes a `Number No Longer Exists` message that users put on switches to answer calls to unused extension numbers. They are false answers only in the sense that most voice response applications transfer callers to support personnel actively available. Another example is modem or fax terminations that send tones not recognized by the VRU. Therefore, the VRU hears the ring and then silence, which is a successful call, not an exception.

9.3.4.3 PhoneMail System Answering

If the extension number used for call transfer is a regular user telephone (as opposed to an ACD agent) and the telephone has voice messaging forwarding, the VRU detects ringing. After a certain number of rings (if a person is not in the office, usually four rings) the CBX forwards the caller to that telephone's voice mail box.

To recover a call from the PhoneMail system after several rings, set the continuous ringing time-out option (substep of Wait for Answer) to the number of seconds until ringing stops (before reaching a PhoneMail greeting). Then you can use the No One Answered exception processing step in section 9.3.6, "Blind Transfer with Recovery Outline" on page 9-14 to pull back the call.

If you want to cut the caller through to the PhoneMail system, set the Wait for Answer substep (# of continuous rings) to zero, and have the No One Answered exception step point to a Disconnect step. In this case, the caller hears ringing, followed by the PhoneMail greeting.

9.3.5 Wait for Answer: Exception Processing

Exception processing under Wait for Answer does all of the special call handling. The rest of this section discusses how to use these exception processing steps.

Exception processing monitors for negative events. If no negative events have occurred, you might assume that the call has actually been answered.

The VRU exception process steps and the tones or conditions it responds to are:

- No One Answered
  - Ringing, or
  - Ringing, then PhoneMail greeting, messaging, and recording.
- Busy Tone
- Fast Busy Tone
- Line Did Not Ring
  - Do-not-disturb (DND) tone
  - Silence or sometimes voice
  - Immediate answer: PhoneMail greeting, messaging, or recording
  - ACD agent telephones on auto-answer.
- Primary Line Disconnect
  - Caller disconnect
  - Error tone.

The VRU can detect and recover all of the above tone conditions except DND. Special application outlines for Do Telephone Signaling can be arranged to handle many of the remaining conditions. Section 9.3.4.3, "PhoneMail System Answering" on page 9-9 discusses the PhoneMail system.

The next sections give more information about the preceding exception steps.

9.3.5.1 No One Answered

The VRU uses this exception step if the line did ring within the first ring time-out period, but no one answered during the continuous ringing time-out period. The ringing continues.

In this situation, the VRU can:

- Pull back (reconnect) the call from the transfer using hook flash *1 and offer the caller options. (See Pull Back in section 9.3.6, "Blind Transfer with Recovery Outline" on page 9-14, which shows only this option.)

  OR

- Cut through after the first ring and let the caller handle the call.

9.3.5.2 Busy Tone

The VRU can recover from conditions in which the transfer target extension is busy. The busy signal is only given for extensions that have not been configured in the CBX or PBX to forward-on-busy to another extension or to the PhoneMail system.

If the VRU detects the busy signal, the caller can be:

- Pulled back to try other VRU options. (See Pull Back in section 9.3.6, "Blind Transfer with Recovery Outline" on page 9-14, which shows only this option.)

  OR

- Cut through to listen to busy tone and disconnect itself or camp on.

To have the caller camp on, you speak a message to the caller informing him of that ability. Camp-on occurs if the caller listens to busy tone long enough for the CBX to recognize that the caller wants to hold waiting for the called party to become available. This is not supported on calls to another CBX switch.

9.3.5.3 Fast-Busy Tone

You hear the fast-busy tone when a call transfer has an extension number located on another switch accessed through tie lines (network call), and there are no tie lines available at the time of transfer request. The VRU can cleanly recover from fast-busy conditions.

If the VRU detects a fast-busy condition, the caller can be:

- Pulled back to try other VRU options

  OR

- Cut through to listen to fast-busy tone and disconnect itself or in some cases camp on to wait for an outgoing trunk. The latter is not recommended. (Only the Pull Back option appears in section 9.3.6, "Blind Transfer with Recovery Outline" on page 9-14.)

9.3.5.4 Line Did Not Ring

The next paragraphs describe how the VRU responds to the following conditions:

Do Not Disturb (DND) and Silence

DND is a legitimate state for an extension when people leave their offices or when a person does not want to be disturbed. DND also occurs in these unusual cases: a call bypasses ACD queuing by going directly to an agent in a work state; or when a user tries to park more than one call on a busy extension.

Note: The VRU treats DND as the Line Did Not Ring.

Ring tone does not precede DND and the VRU does not recognize it. If the VRU tries to transfer a call to an extension on DND, it "hears" silence. Therefore, VRU processing logic for DND tone is sent to Wait for Answer exception processing step Line Did Not Ring after the time-out waiting for the first ring tone. If you typically expect a ring, this is about 5 seconds local or 7 to 8 seconds on tie-line transfers; therefore, this is how long the VRU waits before determining that the line did not ring.

Immediate Answer

Several cases exist in which a line does not ring but a voice is heard on the connection:

- The called extension answers before the CBX has time to send ring tone to the VRU. There is an immediate answer.
- Calls directed to ACD queues where agents are free do not provide ring, but agents answer immediately. (See section 9.4, "VRU and ACD Requirements" on page 9-16 for the solution.)
- If someone transfers a call to an extension that itself is forwarded to the PhoneMail system, the first event is the PhoneMail system message "You may release the call now." That message lasts 4.5 seconds, and you must release the call within 13.5 seconds from the beginning of that message or you reach error tone. (See 9.7.3, "PhoneMail Access Outline" on page 9-32 for the solution.)

9.3.5.5 Primary Line Disconnect

The next paragraphs describe how the VRU responds to the following conditions.

Caller Disconnect

The VRU uses the Primary Line Disconnect step in exception processing when the caller hangs up. The VRU also uses it for error tone. Because the VRU cannot distinguish between the two cases, the solution is to treat it as error tone, and try to recover the call. If recovery fails, it is a true disconnect.

Section 9.3.6, "Blind Transfer with Recovery Outline" on page 9-14 shows this solution.

Error Tone

If the VRU transfers a call, finds error tone, and disconnects the line right away, the CBX calls back the VRU with the original caller. This is the same as when the VRU disconnects the line too early in the transfer. The situation can be con-

fusing, because the VRU answers the call with the first greeting. The caller wonders why he is being asked all the same opening questions again instead of reaching a person.

One solution is to assume that a true disconnect has not occurred. The Wait for Answer exception processing step for Primary Line Disconnect should be customized to Do Telephone Signaling, dial *1 to get the caller back (pulled back), and go to a label where other options can be offered after telling the caller the transfer could not be done at this time.

Note: To dial *1 and reconnect the caller from a Primary Line Disconnect, the telephone configuration must be set to "busy" when the primary line is off-line and when the VRU senses disconnect.

9.3.6 Blind Transfer with Recovery Outline

The following application outline indicates that the VRU application developers have designed the VRU to transfer to a dummy ACD queue which provides ringing only. After the VRU detects ringing, it disconnects.

TRANSFER

1. Do Telephone Signaling
    1. Hook Flash
        a. 500 ms
    2. Listen for Dial Tone
        a. 5 seconds
    3. Dial
        a. *7, 78-100 ms
    4. Dial
        a. Digits are likely from an operator field that is filled with digits from a host screen field, default values, or from the callers themselves.
    5. Wait for Answer
        a. See expansion below
    6. Disconnect
        a. Wait 200 ms before disconnect
2. Proceed to START

Wait For Answer Expansion

1. Wait for an answer
   A. Set Wait for First Ring to 3 seconds if the extension number you are transferring the caller to is local. Use 8-10 seconds for network calls where extension is on another PBX/CBX switch site or node.
   B. Set Continuous Ringing Time-out to 0 (zero).

2. Process Exceptions
   A. No one answered (CUSTOM)
      a. Disregard

   B. Busy signal received (CUSTOM)
      a. Proceed to PULL BACK

   C. Fast-busy signal received (CUSTOM)
      a. Proceed to PULL BACK

   D. Line did not ring (CUSTOM)
      a. Proceed to PULL BACK

   E. Primary Line Disconnect (CUSTOM)
      a. Proceed to PULL BACK

   The remaining steps are standard.

The Pull Back Expansion

PULL BACK

1. Do Telephone Signaling
   a. Hook Flash
   b. Listen for Dial Tone
   c. Dial
      1. Constant *1
2. Speak message
   "An agent is not available. Let me offer you the following options ..."
3. Receive Telephone Input

9.4 VRU and ACD Requirements

The following sections describe some of the basic CBX setup requirements for VRU call transfer in ACD environments.

9.4.1 Fast Transfer

For many ACD applications, the application requires that the call transfer time from the VRU to a supporting person be as quick as possible. You can do this using the blind transfer steps at the beginning of this document under section 9.1, "Agent Call Transfer" on page 9-1. Fast transfers are reliable if you always know the pilot telephone number, and if the possibility of getting fast-busy tone on tie-line transfers is negligible. As long as you observe the work state, CBX configuration, and VRU disconnect requirements, fast transfer is a recommended method. (See "Auto-Work State.")

9.4.2 Auto-Work State

The VRU analog lines typically are members of an ACD queue specifically created for the VRU. ACD calls ring the VRU immediately after the VRU disconnects the line from the last call, so the VRU needs some time to ready itself for the initial host screen. The CBX can be configured so that VRU analog ACD telephones are always in the work state (busy) after a completed call.

Auto-work state is a standard CBX feature option for ACD agent telephones, through a COS flag. The VRU can get ready, and can then tell the CBX to take it out of the work state. The VRU does this by going off-hook, dialing ##0, and disconnecting itself. After a short pause, it places itself immediately into the answer call state. This cycle continues for all calls. The end of the call is auto-work state for the telephone. The VRU resets the host application screens, gets out of work state, and prepares to answer the next call.

The going out of work state and Answer Telephone steps need to come before the Receive CRT Screen step, which seeks the first true application screens from the host. (See section 9.4.4, "Auto-Work State: Answering a Call in ACD Outline" on page 9-17.) This is because with Intelligent Answering, dialed number identification service (DNIS) or multiple session applications, CallPath™ and ACD determine what screen to offer to the VRU at the time the VRU is answering the call. (See section 9.5, "CallPath Requirements" on page 9-21 for more CallPath information.) The screen received from the host computer determines the first spoken message after the answer step. The host screen or its content indicates which VRU application steps to execute next.

9.4.3 Disconnect

If the VRU lines are members of an ACD group with auto-work state in the class of service (COS), make sure the following two standard disconnect options remain standard:

- Option 3 asks if the VRU should answer another call immediately even if it is not ready. Set this to NO (standard).
- Option 4 asks if the VRU line should be busy or ringing when it is on hook. Set this to Yes for leave it on-hook (standard).

™ CallPath is a trademark of International Business Machines Corporation.

9.4.4 Auto-Work State: Answering a Call in ACD Outline

The following application outline assumes that the VRU is in an ACD environment and that the COS for the VRU analog lines includes auto-work state. To answer the telephone, the VRU must take itself out of auto-work state by dialing ##0 before the Answer the Telephone step.

1. Initial CRT Screen is BLANK

    1. Enter data on CRT Screen
       The data is a command entered .n the screen field
       to bring up application screen determined by
       CallPath for this particular caller, or it
       is a fixed application screen/menu per your
       business use.

       Example: Enter V901 in screen field "S-CMD".

       NOTE: The corresponding 'Send CRT screen
       to the host' step is step 6 below. You enter
       the data here before the call is answered to
       expedite the time for sending the screen to the
       host after the call is answered.

    2. Place a Call
       1. Take primary line off-hook
       2. Listen for dial tone
          a. Set wait for 5 seconds
          b. Under Exception Processing
             DISREGARD No Dial Tone Heard.
       3. Dial
          a. Interdigit interval set 78-100 ms
          b. Dial constant ##0

    3. Disconnect telephone line

    4. Pause (1 or 2 seconds)

AWAIT

    5. Answer telephone
       Answer expanded under exception -
          1. Set time-out to 80 seconds
          2. On time-out, proceed to AWAIT

    6. Send CRT screen to host

    7. Receive CRT screen APPLICATION 1
                1. Process expected screen APPLICATION 1
                       1. Speak a message
                       2. Receive telephone input
                          field "C-XXX"
                2. Process expected screen APPLICATION 2

9.4.5 VRU ACD Operation and CBX Configuration

The VRU analog interfaces are members of an ACD queue, and as extensions are to be configured in the CBX as ACD extensions with a COS number having auto-work state features.

9.4.5.1 VRU ACD Call Transfer

This section describes the no-recovery and recovery methods of call transfer, including recovery from busy tone, fast-busy tone, and error tone.

No Recovery Method: Use this when you want to transfer the caller without checking to see if you reach busy, wrong number, and error tone. If you always transfer to the same ACD pilot number(s), you do not get these tones. Therefore, you can configure the VRU to dial the transfer target extension and then disconnect after a short delay (< =1 sec.).

Recovery: Use this when you want to transfer the caller and check to see that the call reaches a successful condition. To recover an unsuccessful call, the transferring VRU can get back to the caller by dialing the CBX feature code (*1) for reconnect. Success can be:

- The VRU detects ringing; not error, busy, or fast-busy tones

  OR

- The VRU detects answer through a dual-tone multifrequency (DTMF) tone.

At each success or failure point, the call can be recovered. A different VRU outline and CBX configuration may be required, depending on when you choose to let the calling customer have the call.

If a tie-line (network) call is transferred to an ACD queue with a free agent available, the VRU does not get a ring unless it is configured for in the CBX or on the agent telephone. Agent telephones typically are auto-answer, which means the telephone does not ring back to the VRU. The agent answers the telephone and the VRU waits for the first ring; the agent hears silence, and the VRU drops the call. This is not what you want, so an indication to the VRU that the call is progressing successfully must be provided, and a dummy ACD queue can provide the required indication.

Dummy ACD Queues: VRU transferred calls should be directed to special CBX hunt group numbers apart from those used by outside callers. The target pilot number should belong to a dummy ACD group. This dummy ACD group can be configured with a single Wait step in the CBX ACD route table, followed by the pilot number of the actual ACD group that non-VRU callers access. The purpose of the dummy group is to give the VRU time to detect ring (successful transfer) that is provided by the ACD Wait step and time to disconnect itself so that the caller will be ready to speak with the answering party.

The ACD Wait step should be set for enough time so that the VRU hears one or two rings. An ACD Wait of 3 seconds or greater can do this.

This CBX configuration gives the following options:

- The VRU can transfer the call and listen for ringing. If it detects anything other than ringing while waiting for the first ring, it takes appropriate action. Examples of the latter are error tone, busy tone, and fast-busy tone.

- The VRU can disconnect itself after detecting a ring, letting the caller speak with the target agent.

If an ACD agent answers the call immediately after the ACD queue recording, the caller is there ready to talk. If the caller is queued, the caller hears the music (if used) provided by the queue.

Section 9.3.6, "Blind Transfer with Recovery Outline" on page 9-14 shows how to do a blind transfer in an ACD environment.

9.4.5.2 VRU Call Transfer between Two Different CBX Switches

The VRU application and the ACD dummy queue methods apply to ACD operations in remote switches as well as to local ones. That is, the originating switch and the terminating (remote) switch both have hunt group pilot numbers and dummy ACD queue for VRU call transfers. For calls transferred to remote switches, make sure the CBX is configured properly at the tie-trunk level and that the tie trunks do **not** have answer supervision.

Some ACD operations distribute calls from one switch to another using ACD queue overflow call routing. Two or more switches can make voice connections between them through tie lines (also called trunks). The originating switch has a VRU that is transferring the call. The originating switch electrically seizes the tie trunk and sends the extension number to the terminating switch.

Until the originating CBX cuts through the voice path, the VRU cannot disconnect from this transfer action to let the caller listen to the terminating switch recording or to a person. Cut-through is the moment when the originating switch connects the voice path of the VRU to the terminating switch. The originating switch does this cut-through when:

- The VRU has dialed *all* of the digits the switch's trunk group has been configured to expect

  OR

- The VRU fails to dial one or more of the expected digits within a period set for the CBX called Time-Out Limited Register/Sender (TMLRS) configurable register-sender timer.

To achieve the minimum cut-through delay, the CBX must be configured with the following:

- TMLRS is set to 5 seconds. The range is 5 to 10, default is 8.
- The trunk access code for the tie line has an expected-digits-table entry;
- The expected-digits-table entry expects the exact number of digits that the trunk needs to outpulse for all calls (if you always dial 5, then set it to five digits).

The extension number that the VRU receives from the host computer must also match the expected number of digits (unless the CBX digit translates).

9.5 CallPath Requirements

IBM/ROLM CallPath is a call center product allowing the transfer of host transaction screens between ACD agent terminals in coordination with the transfer of voice connections between ACD agent telephones. Currently, CallPath requires an IBM/ROLM 9751 CBX in conjunction with an IBM host computer running multiple virtual storage (MVS) with an application under Customer Information Control System (CICS).

9.5.1 CallPath Configuration

The VRU does *not* depend on CallPath to perform call recovery or call completion. It does depend on proper switch and application outline steps to achieve desired recovery objectives.

A CallPath screen follows the voice path handling of a call by the VRU during transfer or recovery because of event information provided by the CBX to CallPath.

The VRU is applied in the CallPath environment in the same manner and with the same requirements as stated in section 9.4, "VRU and ACD Requirements" on page 9-16. The following sections describe some more requirements specific to CallPath.

9.5.1.1 CBX Analog Interface Configuration

The VRU analog lines are members of an ACD queue, and are configured in the CBX as ACD extensions with a COS number having both Auto-Work State and CallPath (CPTH) features.

9.5.1.2 VRU Terminal Configuration

The VRU should be configured as a central unit terminal (CUT) in the host and controller, and not as a distributed function terminal (DFT). A CUT terminal is a "dumb" terminal, whereas the DFT has some "intelligent" functions it can share with the host.

The VRU should have a terminal status of Yes when configuring the VRU as an agent terminal in the CallPath Extension to Terminal Table Maintenance screen. This option allows the VRU to receive an initial screen with a new CallPath call. In addition, you may want to set the "xfr" option to yes in the Extension to Terminal Table Maintenance screen so that CallPath sends a transfer notification screen to the VRU when the VRU executes a call transfer. Refer to 9.5.1.4, "CallPath Notification Screens" on page 9-22 for a description of the notification screen use in the VRU application. Refer to the CallPath Installation and Configuration Guide to set the terminal status and xfr options.

9.5.1.3 CallPath Host Screens during Transfer

The following example describes the host screen transfer in which the VRU is the first agent to answer an incoming call:

```
Straight Transfer (Agent 1 [VRU] to Agent 2)
```

The VRU dials hook flash *7 and the extension number, waits awhile, and then hangs up. The VRU's original caller screen data is now out of its control. Agent 2 has control of the screen data.

If the VRU decides not to disconnect but instead to pull back the call before Agent 2 answers, the VRU's screen remains active with the original data.

9.5.1.4 CallPath Notification Screens

CallPath can be configured to deliver a notification screen to the VRU when the VRU executes a call transfer. The notification screen provides the following information:

- The screen and call were assigned to an agent.
- The screen has been saved. The voice call is probably queued waiting for an agent.

Because of possible delays in host processing, it may be desirable to provide time for the host to save the application screen corresponding to the VRU transferred call before the VRU proceeds to START and returns to the initial screen list. If sufficient time is not provided for the host to save the current application screen, then the host will save an incorrect initial screen, thus providing the target agent no relevant information. To provide the host time, the VRU can wait for a CallPath notification screen after disconnecting the transferred call and before proceeding to START. The application outline describing this process is shown in 9.5.4, "CallPath Notification Screen Outline" on page 9-24.

9.5.2 CallPath Delayed Voice Application

When an ACD CallPath agent receives a transferred call, CallPath tries to deliver the first agent (or VRU) screen to the target ACD agent's terminal at the same time the ACD agent's telephone rings. As a design objective, it may be desirable to allow the ACD agent time to examine and review the screen's content before actually speaking with the caller. This delay can be achieved using the Agent-Controlled Answer, described in 9.6, "Agent-Controlled Answer" on page 9-26.

9.5.3 CallPath Transaction Identification

The following sections describe CallPath transaction identification methods.

9.5.3.1 CallPath Statistics Integration

CallPath has an applications program interface (API) that allows host applications to build their own statistical reports. For statistical tracking, system administrators can use the CallPath "unit of work ID" number, a number that CallPath assigns to each call to identify that call and its processing.

If CallPath system administrators so desire, they can put this unique index number in the initial application screen sent to the VRU at the time the VRU answers a call. This provides excellent call tracking benefits.

9.5.3.2 Process Coordination Applications

Based on the unit of work ID provided in application screens, the VRU can use the application outline step Log Record (not attached) to print out in "real time" the actions the VRU takes with that given transaction (unit of work). The VRU can print out one or more log records for a given call.

Log recording allows the VRU user to analyze VRU CallPath operations on an individual call basis. Log recording can be turned on and off through a host screen indication in conjunction with appropriate VRU outline logic.

9.5.3.3 CallPath, VRU, and Transaction Messaging

The caller in the PhoneMail system can also record the unit of work ID number at the beginning of a recorded message. If the VRU application incorporates the outline steps in section 9.7.3, "PhoneMail Access Outline" on page 9-32 and adds more steps to speak the unit of work ID number into the recording (before connecting the caller to the recording session), the recording will have a transaction-associated identification with the CallPath application. Later, an administrative agent can listen to the recorded message and know exactly which host application transactions it is associated with.

This method works with any host application that tracks transactions and has unique record identification numbers. CallPath provides a means of coordinating the events in the CBX, host, VRU, and CallPath itself into one administrative mechanism.

9.5.4 CallPath Notification Screen Outline

The following application outline assumes that the VRU begins the transfer process under the application screen A. After disconnecting from the transferred call, the VRU uses the CLEAR key to send application screen A to the host, then waits to receive a CallPath notification screen. Because there are several CallPath notification screens, the application designer can list all or only one notification screen under the expected screen processing step. If the application designer chooses to list only one CallPath notification screen, then any unexpected or unrecognized screen received should indicate successful receipt of one of CallPath's notification screens.

The VRU must initiate the receipt of a CallPath notification screen by using the Send CRT Screen to Host step. In the example below, the AID key, CLEAR, is used to send screen A to the host. However, in your environment you might need a different AID key. Experiment to determine which AID key is appropriate.

```
TRANSFER
   1.  Do Telephone Signaling
          Hook Flash
          Listen for Dial Tone
          Dial
          Dial
          Wait For Answer
          Disconnect
    2.  Move 0 into operator field O-TIMEOUT
REPEAT
    3.  Send CRT Screen to Host    (CLEAR key)
    4.  Receive CRT Screen Notification
          Process expected CRT Screen Notification
            Proceed to START
          Process expected CRT Screen A
            Add 1 to O-TIMEOUT
            If O-TIMEOUT is > 2, proceed to START
            Proceed to REPEAT
          Process unexpected unrecognized screen
            Proceed to START
          Process Host Timeout
            Proceed to ERROR W CALL
```

9.6 Agent-Controlled Answer

An ACD administrator may want to pull back a transfer call up to the point at which the ACD agent actually answers. This happens when calls go to remote switch sites that have ACD queuing, and when it is important that the caller finally get to some agent. The VRU can pull back the caller after a specified time, and reroute the caller to another switch-site agent or to a local spillover group.

An agent-controlled transfer (similar to a screened transfer) is one in which the VRU waits for the target extension to answer, then informs the answering party of the call before the caller is connected to the party. The VRU's efficient use of the following requirements can do this:

1. The VRU does not disconnect the line after detecting the dummy ACD queue ring: it immediately goes into a special loop cycle.
2. The VRU keeps repeating the message "VRU calling, please enter a touch-tone digit," and then listens for any digit. (See Receive Telephone Field Input step in section 9.6.1, "Agent-Controlled Answer Outline" on page 9-27.)
3. The cycle continues until an agent answers and presses the digit. If desired, the administrator can have the VRU set up to pull back calls from the queue after several seconds or minutes by having it hook-flash dial *1.
4. The caller can be given other options.

If the ACD agent answers at any time, the agent presses any digit on his DTMF telephone (ROLMphone® telephone or standard analog telephone) and the VRU disconnects the line immediately, letting the caller talk to the agent.

The limitations of this recovery method are:

- The VRU channel is unavailable for other calls while waiting for queued ACD calls to reach someone.
- The ACD agents must change current behaviors by dialing a digit to answer the VRU messaged calls.
- The VRU will time-out waiting for telephone input after a user-definable period. At this point, the VRU should reconnect to the caller and offer him other options.

® ROLMphone is a registered trademark of International Business Machines Corporation.

9.6.1 Agent-Controlled Answer Outline

The following screen transfer outline is the same as the Blind Transfer with Recovery Outline, with the following modifications and additions: It is designed to receive telephone input from an agent and it loops until it receives telephone input. You set up the number of times it loops by placing some constant number in the operator field (O-TRY) at the beginning of the outline. The larger the number in O-TRY, the longer the VRU waits for telephone input from the target agent.

Assume you set an operator field O-TRY to 6 and the caller has requested to transfer to an agent.

```
TRANSFER
        1. Do telephone signaling
           Same as Blind Transfer with Recovery except:
           Wait for Answer Exceptions
             a. No One Answered (CUSTOM)
                Proceed to CYCLE
             b. Busy Signal received (CUSTOM)
                Proceed to PEXCEPT
             c. Fast-busy signal received (CUSTOM)
                Proceed to PEXCEPT
             b. Line Did Not Ring (CUSTOM)
                Proceed to CYCLE
        2. Proceed to label CYCLE
PEXCEPT
        3. Do telephone signaling
             a. Hook Flash
             b. Listen for Dial Tone
             c. Dial (78 ms, '*1')
        4. Speak a message "I'm sorry.  I can't transfer
           at this time."
        5. Proceed to label OFFER
CYCLE
        6. Move data into an operator field
             a. Source is constant 0
             b. Operator field is O-CYC
INLOOP
        7. Speak a message  "VRU calling.  Please press a digit"
        8. Receive telephone input field "T CYC"
           Options:
             1. Primary
             2. Yes
             3. 1 second
             4. 1 second
             5. 60 seconds
             6. 4 tries
             7. No
             8. No
            Exceptions:
             1. Timeout
                a. Move data into modified
                   operator field "O-CYC"
                   1. add data to field
                      (add 1 to counter)
                b. Make decision
                    If O-CYC > O-TRY
                    proceed to PULLBACK
                c. Proceed to INLOOP
              2. Other exceptions
                  2-8 Disregard, 9-12 Standard
        9. Proceed to label DISC
```

PULLBACK

10. Do telephone signaling
    a. Hook Flash
    b. Listen for dial tone
    c. Dial (78 ms, '*1')

OFFER

12. Speak a message "I am sorry, but the agent is not currently available. Let me provide you with other options."
13. Receive telephone input field "T RTY"
14. Make a decision
    If T-RTY >= 1, proceed to RTRY.
    RTRY label not shown here. It is the area of the outline offering the caller the original option choices.

DISC

15. Disconnect telephone line
    a. Primary
    b. Wait 0 seconds
    c. No
    d. Yes (if ACD w Workstate)
16. Proceed to label START

9.7 Special Applications - PhoneMail Transaction Messaging

The VRU can refer callers to a PhoneMail message and assist them in recording a PhoneMail message, allowing them to return to the VRU for further transactions. The VRU model 80 (9274) cannot support this PhoneMail application because the model 80 does not have referral line capability.

The access time to record or listen to a message within the PhoneMail system is 8 to 9 seconds, and the recovery time for further VRU interaction from the PhoneMail system is less than 1 second.

Use of this method depends on three factors:

- The PhoneMail listen message must begin and end with a DTMF tone.
- The initial greeting message must begin with a tone.
- Callers must not mind indicating when they are through by dialing a DTMF tone themselves.

9.7.1 Listening to a PhoneMail Message

The PhoneMail system can be used to provide a system status message for host computers or to provide telemarketing promotional messages from within the VRU caller session. When the VRU receives a call, use of the application outline can determine if the caller should hear the message by various methods.

The VRU goes off-hook on the secondary VRU line (referral line) and dials an extension number of a telephone forwarded to its PhoneMail box. The personal greeting is the marketing message. The greeting should begin and end with a DTMF tone (for example, #-digit). The message can be any length allowed by PhoneMail configuration. You record the greeting from any plain 2500 set telephone, press the #-digit, say the message, then press the #-digit again. You must use a 2500 set telephone to record, because ROLMphone telephones do not generate a DTMF tone after they connect (as do 2500 sets). You must hold down the #-digit for 2 to 3 seconds. Experiment with it.

The VRU listens for the first tone and bridges the caller with the secondary line (PhoneMail). It does this with the Bridge step in Do Telephone Signaling. (See 9.7.3, "PhoneMail Access Outline" on page 9-32.)

The VRU listens for the second tone, then unbridges the lines and disconnects the secondary line. The tone can come from the caller, too, if the caller does not want to hear the whole message.

The VRU now offers the caller other options.

9.7.2 Leaving a PhoneMail Message

The VRU application designer may want to allow callers the ability to leave messages when ACD agents are not available or if callers want to comment on their host transactions. To do this, the VRU follows all of the same methods described in "Listening to a PhoneMail Message."

1. The greeting can have the same wording as that mentioned under "Listening to a PhoneMail Message."

2. When the VRU hears the first tone, it dials *1 out of the secondary line to tell the PhoneMail system that it wants to bypass the rest of the greeting and proceed with recording.
3. The caller hears the PhoneMail beep tone to start recording and leave a message. Then the caller dials a #-digit as instructed earlier by the VRU. The VRU detects the # indication, then unbridges and disconnects the line from the secondary line. The caller is offered other options.

9.7.2.1 Limitations of This Method

If the caller hangs up after finishing recording his messages, the PhoneMail system records the disconnect and dial tone as part of the message.

9.7.3 PhoneMail Access Outline

The following application outline shows how to reach a marketing message in the PhoneMail system or leave a message in the PhoneMail system from within a VRU customer-service-type application.

Assume that the caller has selected an option to leave a message, or that the application determines that the caller hear a message. The application outline sets a preference flag (O FLG), then proceeds to label "PHML."

Set the operator field 0 FLG to 2 if you want to listen to a message or 1 if you want leave a message.

```
PHONEMAIL
      1.  Place a Call
          a. Take secondary line off-hook
          b. Listen for Dial Tone
             1. Note - on secondary line
          c. Dial
             1. On secondary line
             2. The target extension number
                for message functions
          d. Wait For Answer
            1. On secondary line
            2. Wait 3 seconds for first ring
            3. Continuous ring 0 seconds

           Exceptions  -
            1. No one answered (DISREGARD)
            2. Busy signal     (CUSTOM)
            3. Fast-busy       (CUSTOM)
            4. Line did not ring (DISREGARD)
            5. Primary line disconnect (STANDARD)
            6. Secondary line disconnect (CUSTOM)
               a. Proceed to REOFFER
      2.  Receive telephone input field "T First"
            1. Receive input on secondary
            2. Yes
            3. First character time-out 15 seconds
            4. Next characters time-out 1 second
            5. All characters  time-out 7 seconds
            6. Number of tries 0
            7. Yes
            8. All data character '#'

            Exceptions -
            1. First digit time-out (DISREGARD)
            2. Next input time-out  (DISREGARD)
            3. Total input         (DISREGARD)
            4. Too many characters (STANDARD)
            5. Abort character     (DISREGARD)
            6. All remaining       (STANDARD)
            7. Secondary disconnect (CUSTOM)
      3.  Make a decision
            If 0 FLG = 2, proceed to BRIDGE
MSG
      4.  Do telephone signaling
            1. Dial  (*1)
               PhoneMail command to leave a message
            2. Pause (400 ms)
            3. Bridge telephone lines
            4. Pause (2000 ms)
      5.  Proceed to label END IT
BRIDGE
      6.  Do telephone signaling
            1. Bridge telephone lines
```

```
END IT
      7.  Receive telephone input field
            1. Primary
            2. No (CUSTOM)
            3. 180 (CUSTOM)
            4. 5  (STANDARD)
            5. 60 (STANDARD)
            6. 0 (CUSTOM)
            7. YES
            8. #

          Exceptions -
            1. Time-out Waiting First (DISREGARD)
            2 - 4  (STANDARD)
            5. Abort character (DISREGARD)
            6 -12  (STANDARD)
      8.  Do telephone signaling
            1. Unbridge telephone lines
      9.  Speak a message
     10.  Disconnect telephone line
            1. Secondary (CUSTOM)
            2. Wait 0 millseconds (CUSTOM)
            3. Immediate answer NO (STANDARD)
            4. Leave on-hook YES (STANDARD)
     11.  Proceed to label CTRY
```

Label CTRY allows you to continue doing other transaction processing for your application.

Chapter 10. Outbound Calling

The VRU can place calls directly to off-net, on-net, and local extensions. The source of these telephone numbers can be a host screen or predetermined telephone numbers in the application outline. The application outline step for this dialing function is Place a Call.

Three specific classes of outbound calls are *power dialing*, *predictive dialing*, and *notification*. Power dialing tries to place a call for an agent, saving dialing time. Predictive dialing tries to place as many calls as possible to keep all agents within a group busy, and still not place any called parties on hold at the same time. Notification is an outbound call trying to deliver host-based information or a voiced message to a specific individual. Notification usually would not transfer the call to an agent, but could if the called customer so requested. The VRU is effective for notification. It is not effective for predictive dialing and has limited value in power dialing applications. The following sections describe the reasons.

10.1 Notification Applications

You can use the VRU to notify customers that shipments have arrived, payments are overdue, or appointment times have been scheduled for some service (repair or other service).

The source of the telephone number would be a host application, and the number would go to the VRU through the screen when a notification event occurred.

The VRU would place a call and wait for the called party to indicate they will accept the call. If the telephone is not answered, if the line is busy, if there is a ring-no-answer condition, or if the caller does not hear the call, the application outline can set an indication in the host application screen for further host action or decisions. The host screen field is useful to show that the called party 1) hung up before hearing the whole message, 2) indicated acceptance of the message (dials a digit), or 3) never answered. Never-answered calls could be redialed automatically later.

If the called party accepts the call (dials a digit), the VRU delivers the informational message. It can do this with speak messages, or by transferring the caller to a PhoneMail mailbox message.

See section 10.2.3, "Outbound Calls for Notification Applications Outline" on page 10-3 for notification steps used when the VRU dials the customer. It does not show the application-specific steps to enter call disposition on the host screen, nor the construction of the final informational message.

10.2 Why Not VRU Power Dialing and Predictive Dialing?

The VRU is not effective for power dialing and predictive dialing because they must have the following capabilities:

- Answer detection
- High-speed call transfer.

The VRU can use ringing detection to sense when ringing has stopped and can then try to transfer the answering party to an agent. The VRU needs 4 seconds to determine that the ringing stopped, and 5 seconds to transfer the call, for a total of 9 seconds after the called party answered. Clearly, this is not workable.

An improvement to this would be to disregard the Wait for Answer step entirely and to listen for called party acknowledgement instead. In this method, the VRU continually "speaks" into the line saying, "This is XYZ company. If you would like to receive our personal message for you, enter a touch tone." When the VRU detects the tone, it transfers the call. This reduces the transfer to roughly 5 seconds, which is still slow. How well customers will respond by dialing the acceptance tone is not known.

10.2.1 Why Not VRU Voice Detection?

The transmission lines in a telephone call can be poor, and the voice can be weak. Some people do not say much more than "Hello" and "Yes." Or, they have a short conversation when they pick up the telephone. These conditions are too uncertain for a reliable operation. The VRU currently "detects" some voiced words as ringing followed by end of ringing; this is the "call was answered" condition, but this use is unreliable.

Voice detection can help complete calls that were transferred to extensions forwarded to messaging, or to telephones that were instantaneously answered before the CBX delivered ringing to the VRU. Some applications do not require connecting the caller to the transfer number if the user does not want calls going to PhoneMail forwarding. This ring can be an asset or a problem, and in either case is not reliable. Special application outlines are therefore needed for forwarded calls. Section 10.2.3, "Outbound Calls for Notification Applications Outline" on page 10-3 shows these.

10.2.2 Why Not VRU Central Office (CO) Signaling?

Answer supervision is the positive confirmation COs give to common carriers indicating that called customers have actually answered their telephones (gone off-hook). Carriers can offer that information to CBXs if the access trunk is ordered for that service, and if the CBX can accept the signal. The IBM/ROLM CBX does not relay that information to the line-side devices, except to the Attendant Console (ATC). The ATC is not a 2500 set interface. Consequently, the VRU cannot currently receive answer supervision indication.

10.2.3 Outbound Calls for Notification Applications Outline

The following application outline includes the steps the VRU uses to perform outbound dialing. This application assumes that there is no caller on the line and that the VRU initiates an outbound call to speak information to the receiver.

1. Move data to operator field
   Move system field LINE NUMBER into operator field 0 LINE.

WHICH LINE

2. Make decision
   If operator field 0 LINE = numeric constant (1) in value proceed to label PROCESS 1
   NOTE: Make this decision for each line and proceed to PROCESS 2 for line 2, PROCESS 3 for line 3, etc.

PROCESS 1

3. Make a decision
   If a base screen field exists (this can be a student name or number)
   Proceed to label STAT1
4. Proceed to START

STAT1

5. Make a decision
   If screen field status = 1
   proceed to label LOAD NUM
   (status will indicate to place a call, no call necessary, call again later, etc.)
6. Proceed to WHICH LINE

LOAD NUM

7. Move data to operator field
   Move the screen field containing number to call into operator field 0 DIAL.
   NOTE: If the VRU searches a list of numbers to call, you must duplicate the processes above for each line, so that each line is not accessing the same number simultaneously. Line 1 should being its search with the first telephone number, then skip to the fifth. Line 2 begins on the second telephone number, then skips to the sixth, etc.

OUTC

8. Move data to operator field
   Move numeric constant 4 into operator 0 TRY. This is the number of rings to wait for a called number to answer.
9. Place a Call
   a. Take primary line off-hook
   b. Listen for dial tone
   c. Dial
      This can be an extension, business, or residential telephone number. The number can be a constant or derived from a a screen field or operator field.
   d. Wait for Answer
      Wait for an answer
      a. Set wait for first ring to 4 seconds if the number to which you are transferring is local. Use 8-10 seconds for network calls where the

```
                    number is on another PBX/CBX switch site or node.
                 b. Set continuous ringing time-out to 0 (zero).
                 Wait for answer exceptions
                 a. No one answered (CUSTOM)
                    Proceed to CYCLE
                 b. Busy signal received (CUSTOM)
                    Proceed to PEXCEPT
                 c. Fast-busy signal received (CUSTOM)
                    Proceed to PEXCEPT
                 b. Line did not ring (CUSTOM)
                    Proceed to CYCLE

      10.  Proceed to label CYCLE
PEXCEPT
      11.  Log message of failed attempt
      12.  Send failure notification to host screen
      13.  Proceed to label DISC
CYCLE
      14.  Move data into an operator field
             Move the numeric constant 0 into
             operator field O-CYC
INLOOP
      15.  Speak a message
             XYZ company calling with an important message for
             you; please press any number on your telephone
             to accept this free call.

      16.  Receive telephone input field "T CYC"
             Accept Input
             1. Primary
             2. Yes
             3. 1 second
             4. 1 second
             5. 60 seconds
             6. 4 tries
             7. No
             8. No
             Exceptions
             1. Time out
                a. Move data into modified
                   operator field "O-CYC"
                   1. add data to field
                      (add 1 to counter)
                b. Make decision
                   If O-CYC > O-TRY
                   proceed to NO HEAR
                c. Proceed to label INLOOP
             2. Reprompt for input
                  2-8 disregard, 1, 9-12 standard
      17.  Proceed to APPS
```

```
NO HEAR
      18.  Speak message
             I haven't heard your response.  We'll call
             again later.
      19.  Proceed to PEXCEPT
APPS
      20.  Speak message
             Thank You.  Let us tell you about...
             your package arrived, etc.
      21.  Send update to HOST screen...
             Send a numeric status to host.
DISC
      22.  Disconnect telephone line
           a. Both
           b. Wait 0 seconds
           c. No
           d. Yes (if ACD with Auto-Workstate)
           Process exceptions:
           NOTE: If you are using repeating fields to
           search a list of numbers proceed to the
           label WHICH LINE.  Do not proceed to START.

      23.  Proceed to label WHICH LINE
```

10.3 CBX Analog Telephone Interfaces

The VRU has an analog interface to the CBX. This means that it can only perform as well as any user of a plain analog DTMF telephone, called the 2500 set.

Note: The VRU is bound by the capabilities of a 2500 set on the given switch. When you want to train the VRU to perform a given task as a telephone device, time and analyze the process first manually using a telephone. If you cannot achieve your objectives with manual dialing, you cannot do the tasks with the VRU.

The VRU supports two types of analog interfaces: the first is the standard station-line interface (analog telephone interface [ATI]) and the second is the off-premise extension (OPX) line. The OPX interface can supply the line current disconnect, which is faster than the dial tone disconnect of the standard analog interfaces. This guide recommends the faster disconnect for those concerned with maximum VRU-channel availability in the busy hour. OPX interfaces on the CBX cost somewhat more than the ATI, and only the OPX interface on the 9751 CBX and later release provides the faster line current disconnect.

The VRU has two analog interfaces for each channel card. The primary line (analog 2500 set) interface answers and places calls. The secondary (or referral) line can only place calls. When a VRU primary line is connected to CO or centrex telephone lines, it must use the secondary line to transfer calls to other extensions. The channel on the VRU is completely dedicated to the call for the entire length of the call, because it acts like a single-channel switch, connecting (bridging) the primary line with the secondary line.

Note: The VRU model 80 (9274) does not have referral line capability.

When the VRU primary line is connected to a PBX analog interface, it can send special feature access digits to the PBX to invoke the transfer process (and other features). Not all PBX systems support the same capabilities, and the feature codes are not the same. Therefore, application outlines in this document apply to the IBM/ROLM CBX environment. Some minor differences are evident among the Redwood, 8000, 9000, and 9751 CBX products.

10.4 VRU Telephone Standards

The VRU application outline examples mostly cite a "standard" configuration setting for different application outline step processes and exception processes. The next paragraphs describe standard and some exceptions used in the application outlines.

10.4.1 Configuration Training

VRU Configuration: The following settings for VRU telephone line configuration are preconfigured in the VRU system files provided with the unit. The "busied out" setting for option 2 is required for application outlines trying to recover call transfers, which on rare occasions end in error tone given by the CBX to the VRU. The telephone configuration standards are as follows:

1. Country the telephone system is for: UNITED STATES
2. When off-line the primary line state is : BUSIED OUT
3. When disconnect is sensed the primary is: BUSIED OUT
4. On the primary line disconnect is detected by: DIAL TONE
5. On the secondary line disconnect is detected by: DIAL TONE
6. Milliseconds of current interruption to sense disconnect: 100
7. Milliseconds on-hook required to disconnect: 2000
8. Milliseconds to pause after answering a call before allowing input or output on the line: 750
9. Milliseconds between digits when touch-tone dialing: 78
10. Earth recall instead of hook-flash: NO
11. Milliseconds on-hook for a hook-flash: 500.

10.4.2 Exception Processing

The exception processes are preconfigured in the VRU system files. The following paragraph describes a change required in the Wait for Answer step. You specify this change within the application outline step itself.

Wait for answer: If you use the Wait for Answer step for a call transfer process and the VRU finds an error tone, the VRU interprets the tone as dial tone. This indicates disconnect to the VRU. The VRU application outline process goes to the Primary Line Disconnect step under "Wait for Answer: Exception Processing." Because a caller is on hold, the VRU must recover the call, not disconnect the line. To do this, the VRU outline uses Do Telephone Signaling (see the outlines). A requirement is that the VRU telephone line setting be configured as shown in section 10.4.1, "Configuration Training."

10.4.3 Application Standards

The application standards are preconfigured in the VRU system files. A change in the Disconnect Telephone Line option is described in the next paragraph.

Disconnect Telephone Line: The disconnect options need to have the following settings if the VRU analog channels are members of an ACD queue, and in particular when the VRU lines are configured in the CBX for auto-work state:

1. Which line(s) do I disconnect? Primary (STANDARD)
2. How many milliseconds do I wait before disconnecting the telephone line to end the call? 500 (STANDARD)
3. After disconnecting, if I get another call should I answer it immediately even if I am not ready to process it? NO (STANDARD)
4. I can leave the primary line on-hook (let it ring) or I can make it busy. Should I leave it on-hook? YES (STANDARD).

Part 3, Advanced VRU Topics

Chapter 11. Installation Checklist

This module contains checklists in table format concerning tasks required before installing and training the VRU. It is divided into four major sections:

1. Hardware/Microcode
2. Host/Controller Considerations
3. Telephone System
4. Application Training

1. VRU HARDWARE/MICROCODE

	STANDARD EQUIPMENT	
	Checklist	**Comment**
927X VRU	__ VRU Module __ VRU Microcode __ System files. __ The Company training files.	Note: See PIM Guide Chapter 2, for unpacking procedures.
9270 Standard Accessory Kit	__ 1 AC power cord __ 8 Telephone cable tie/tags __ 2 System cable ties __ 8 Six-foot six-conductor modular cables __ 1 Ten-foot 9350 coax cable __ 1 Coax T-adapter, BNC	Note: The 9274 has 16 telephone cable tie tags and 12 six foot six-conductor modular cables.
5250 Interconnect Kit	__ 1 Ten-foot twinax cable. __ 1 U-connector kit. __ 1 One-foot adapter cable. __ 1 In-line connector.	Note: The 5250 interconnect kit must be ordered separately. The part number is 97D 1026. The U-connector kit contains 1 U-connector, 2 safety ferrules, 1 safety cord.
	OPTIONAL EQUIPMENT	
	Checklist	**Comment**
	__ Serial Printer __ Printer Cable __ Microphone/Headphones __ Replacement fuses	See the PIM Guide Chapter 1, for instructions on cable pin outs.
	__ Floppy diskettes **5.25 - High Density, 96 TPI** **3.5 - 2.0 MB High Capacity**	Note: Using any other diskettes will cause various problems when attempting to backup files, for example, checksum errors.

2. HOST/CONTROLLER CONSIDERATIONS

Security	Checklist	Comment
User Id Password	__ User Ids and passwords created for host sessions.	Note: Each line of the VRU represents a host session initiated by an individual terminal. Depending on the application you may need to create multiple user ids and passwords. (so that each line has a user id and password)
	3270 ENVIRONMENT	
9270 VRU	**Checklist**	**Comment**
Connectivity	__ Cables for controller to VRU connections.	
Terminal	__ Supported CUT terminal on site. __ Terminal and connections to controller working and tested.	See planning, Installation and Maintenance Guide for supported terminals.
9274 VRU	**Checklist**	**Comment**
Connectivity	__ Order equipment to provide remote connection via one of the following: __ Limited Distance Modems. __ IBM 5822 Data Service Unit/Channel Service Units. __ Modems. __ Modem Eliminator. __ Order cable for VRU to Modem connection. __ V.24 __ V.35 __ Order PU and LU connections.	The VRU attaches to a 3745, 3725, or 3720 Communication Controller or an ES/9370 remotely via modems. Direct attachment is not supported. Each VRU requires 1 PU2.0 connection and 12 LU connections.
Terminal	__ Supported CUT mode terminal on site. __ Terminal and connections to controller working and tested.	The 9274 supports only the 1920-character 3278 Model 2 screen size. See Planning, Installation and Maintenance Guide for supported terminals and keyboards.
VRU	__ Configure the 3174 SNA/SDLC Options.	See Planning, Installation and Maintenance Guide Appendix C. The VRU must be configured properly before any communication is possible between the VRU and the host computer.

2. HOST/CONTROLLER CONSIDERATIONS (cont.)

5250 ENVIRONMENT		
System Unit	**Checklist**	**Comment**
	__ VRU identified on System Unit.	The system unit must be configured to recognize each VRU as a 3196 Model A1 terminal.
Connectivity	__ 5250 Interconnect kit on site.	The only supported method of connecting a VRU to an AS400, System 36, or System 38 is the interconnect kit, which provides a local attachment.
Terminal	__ Supported terminal on site.	See Planning, Installation and Maintenance Guide for supported terminals.
	__ Terminal setup	Set the terminal address to 0. See the terminal documentation for terminal setup.
VRU	__ Define the host address and port to which the VRU is connected.	See VRU Training and Operation Guide, Chapter 6 for instructions.

3. TELEPHONE SYSTEM

Note: The following tables contain some vendor specific information. The ACD and TIE TRUNK information is based on the ROLM CBX switch capabilities. Check the vendor documentation to ensure the VRU functions properly with the telephone system.

TELEPHONE LINES

Switch type	Checklist	Comment
Switch is touch-tone	__ Lines/Switch uses standard loop-start signaling.	CENTREX or Central Office lines should be arranged in a hunt group. The lines should also have hook-flash feature(CTX).
	__ Place order for enough analog telephone lines to satisfy the VRU requirements.	**Note:** The telephone lines should not have self test capabilities.
	__ Modular jacks ordered.	The phone should be available for testing or recording purposes.
	__ Order one standard 2500 analog touch-tone telephone.	

SWITCH PARAMETERS

Feature	Checklist	Comment
Disconnect Detection	__ Switch uses line current interrupt.	The default for disconnect detection is dial tone. From the Configuration Menu choose Display VRU Configuration Menu. Expand a telephone line and change the method of detection. (Save changes to all telephone lines for each module.)
	__ Switch does not use either dial tone or line current interrupt.	Train the VRU to time out instead of waiting for a disconnect signal.
	__ Switch does not send recognizable disconnect on hook-flash transfer.	Train the VRU to time out instead of waiting for a disconnect signal.
Hook flash	__ Switch requires on-hook time greater than the VRU default.	Change the Milliseconds on-hook for a hook flash if your system is not equal to the 500 millisecond default. From the Configuration menu choose Display VRU Configuration Menu. Expand a telephone line to change the default. (Save changes to all telephone lines for each module.)
	__ Switch requires a pause after the hook-flash before dialing the extension or outside number.	Train the VRU to pause the specified time as a step under Do Telephone Signaling in the Application Training outline.

ACD FUNCTIONS ROLM CBX

Note: The primary function of ACD is to distribute calls on a shared basis to agent phones in the available state. An agent becomes available when a call is completed. This means the agent could receive another call almost immediately. An agent enters the work state to temporarily block incoming calls while completing tasks associated with the last call.

Feature	Checklist	Comment
Class of Service	__ Request feature AWK in class of service for VRU "agent phones".	When (AWK) automatic workstate is in the class of service for an agent's phone it will busy the phone immediately after a call is completed. This will allow the VRU time to return to the Answer the Telephone step before receiving another call.
	__ Train VRU to make itself available if AWK is in COS.	Insert a Do Telephone Signaling step prior to the answer the telephone step. The number to enter will be the CBX command ##0. This command places the agent phone in the available state.
ACD Group Information	__ Request VRU ACD Group to handle incoming calls.	It is recommended that the VRUs be placed in a separate ACD Group that will overflow to an ACD Group with live agents.
ACD Call Transfers	__ Request "dummy" ACD Group to handle call transfers.	The "dummy" group will contain a single Wait step in the CBX ACD route table and the pilot number of the target ACD group. This group provides the VRU enough time to detect ring and complete the transfer. For detailed information refer to the Call Transfer section.

TIE TRUNK INFORMATION

Feature	Checklist	Comment
Note: There can be some delay when transferring calls over tie trunks to remote switches, or nodes. To minimize delays on the ROLM CBX, you must make sure that the tie trunks are configured properly. For additional information refer to the Call Transfer section.		
CBX System Time Parameter	__ TMLRS set to 5 seconds.	TMLRS(limited register/sender timer) controls the number of seconds the CBX waits before connecting a call to the trunk. The timing begins after the digits are dialed and the register/sender is released.
Trunk Access Code	__ Should have an expected digits table entry.	The table is configured to expect the exact number of digits the trunk expects to outpulse for calls.
Test	__ No self test capabilities.	
General Attribute Trunk Groups	__ DISC SUPV set to no	Answer supervision is not recommended on tie trunks the VRU will be using to transfer calls.

PLANNING MATERIALS	
Checklist	**Comment**
__ Print copies of each screen to be used in the application.	Highlight all fields that require data entry, or fields that the VRU will read to the caller. Also, note the key you will define to send a screen to the host.
__ Obtain a set of Application Training worksheets.	The worksheets will help you organize the information that will be coded in the application training outline. The worksheets can be found in the VRU Training and Operations Workbook.
__ Obtain a copy of Hone/Equal flash titled 9270 Training Guidelines.	The guidelines will help you to avoid problems that occur when the operating conventions of the VRU are not followed. (Guidelines are also in Training and Operations Workbook, Chapter 1.)

INITIAL SCREEN LIST PLACEMENT	
Checklist	**Comment**
Base Screen	The BASE screen is a defined starting point for the application. It is here that the telephone is answered and interaction between the caller and the host begins. A path branching from the BASE screen is built incorporating the additional screens required to complete the callers transaction.
Recovery Screens	The recovery screens tell the VRU how to get back to the BASE screen from its current location when a call is terminated. Each screen that is used in the application under BASE screen processing must be listed as a recovery screen and listed in the recovery steps.
Logon Screens	Code each screen in the expected order of the logon sequence. Remember to include any screen that is possible for the VRU to encounter when logging on to the host application. For example, blank, inactive session, invalid id/password. If multiple user ids and passswords will be used in the application you must build a translation table. The VRU will use this table to correlate the line number with its user id and password.
Unexpected/Unrecognized Screens	Locate all commonly used labels under unexpected/unrecognized screens. For example, ERROR WITH CALL, TRANSFER, and AFTER HOURS. Note these labels are not specific to a particular screen. Placing the commonly used labels here will save additional coding steps and not violate VRU system operating logic.

Chapter 12. OPERATOR SCREENS

The VRU uses operator screens to read and speak information that is unavailable on the host. This information may fluctuate daily creating the need to update the screen without taking the VRU off line.

The screens are stored on the hard disk of the VRU and are accessed upon request. On completion of their associated tasks the screens are returned to the hard disk using the RESET key and the VRU is directed to the previous screen in the Application Training Outline.

12.1.1.1 Creating an Operator Screen

Operator screens should be created using the same criteria as host screens. Existing screens can be modified to suit your needs or, a new screen can be created. To create an operator screen choose Access Operator Screen in the application outline. This step is expanded and the VRU displays a step list with the following choices: Read operator screen, Read operator screen for edit, and Write operator screen.

- Read operator screen is used when the VRU will read the screen to the caller.
- Read operator screen for edit allows the system administrator to call the VRU and update the screen by following a series of prompts that are defined in the application training outline.
- Write operator screen is used in conjunction with read for edit. Its purpose is to write the updated screen to the hard disk.

12.2 Read Operator Screen

In the following application training the caller wants to know the current interest rates on a money market account. The VRU will speak the low to high dollar amounts and the interest rate. Notice that the interest field is broken into two operator fields in order to speak the interest rate. It does not speak the dollar amounts that have an interest rate of 0. The decimal point and percent are built into the Speak a message step.

12.2.1.1 Application Training Outline

The VRU is directed to perform a line to line search, from the top to the bottom of the list, using the logic if S BASE exists ALL the NEXT occurrences apply. On each line the VRU will step through a series of decisions: does an interest rate apply, is this the first time I have searched the list, and does the same interest rate appear on multiple lines. Depending on the answers the VRU will: move data into operator fields, move to the next line, update the operator fields if applicable, and speak the correct rates.

```
Initial CRT screen is "BASE"
1. Access Operator screen.
2. Read Operator Screen.                          Comment:  Expand this
                                                  step and add the expected
                                                  screen.

   1. Process expected Operator screen "MARKETRT"
   2. Move data into operator field
         The source of data is the numeric constant 0
         The operator field name is O COUNTER
   3. Move data into operator field
         The source of data is the numeric constant 0
         The operator field name is O INT

FIND RATE                                         Comment:  Step 4 directs
   4. If SF: S BASE exists                        the VRU to begin
      (repeats, ALL of the NEXT apply)            searching.  If S BASE
      Proceed to label  "CHECK INT"               does not exist, the VRU
                                                  falls to step 5.
   5. Proceed to label "DONE"

CHECK INT
   6. If SF: S INT = alphanumeric                 If no interest is to be
      constant .00                                paid the VRU will search
      THEN: Proceed to label "FIND RATE"          the list again.

   7. If OF: O COUNTER = 0
      THEN: Proceed to label "MOVE VALUES"

   8. If SF: S INT = OF: O INT                    If the interest rate is
      THEN: Proceed to label "MOVE HIGH"          the same as the previous
                                                  line the VRU must change
                                                  the high dollar amount.
   9. Proceed to label "SPEAK RATE"


MOVE VALUES
   10. Move data into operator field
         The source of data is the screen field S LOW
         The operator field name is O LOW
   11. Move data into operator field
         The source of data is the screen field S HIGH
         The operator field name is O HIGH
   12. Move data into operator field
         The source of data is the screen field S INT
         The operator field name is O INT
   13. Move data into operator field              Comment: S I1 contains
         The source of data is the                data to the left of the
         screen field S I1                        decimal place.
         The operator field name is O I1

   14. Move data into operator field              Comment: S I2 contains
         The source of data is the                data to the right of the
         screen field S I2                        decimal place.
         The operator field name is O I2

   15. Move data into operator field
         Move modified operator field O COUNTER into
         operator field O COUNTER, modify field O COUNTER
         by adding numeric constant 1.
```

```
   16 Proceed to label "FIND RATE"          Comment: Step 16 loops
                                            the VRU back to the
                                            search step to advance
                                            to the next line.

MOVE HIGH
   17. Move data into operator field
          The source of data is the screen field S HIGH
          The operator field name is O HIGH

   18. Proceed to label "FIND RATE"

SPEAK RATE
   19. Speak a message
         Speak phrase: A money market account from
         Speak field:  "O LOW"
         Speak phrase: to
         Speak field:  "O HIGH"
         Speak phrase: dollars
         Speak phrase: pays
      Speak field:  "O I1"
      Speak phrase: point
      Speak field:  "O I2"
      Speak phrase: percent

   20. Proceed to label "MOVE VALUES"

DONE
   21. Send data to the host (using the     Comment:  The RESET key
       RESET key)                           is used to refresh the
                                            screen.  No information
                                            is sent to the host.

   22. Receive CRT screen "BASE"            Comment: Use the name
                                            of the previous screen
                                            to return to the correct
                                            place in the application.
```

Note that the MARKETRT screen below is used in the previous Application Training Outline.

```
                    THE COMPANY
               CURRENT LOAN/MARKET RATES


DATE             LOW          HIGH      INTEREST
02/23/88          .00        999.00       .00
02/24/88        1000.00      2499.00      5.75
02/25/88        2500.00      9999.00      5.75
02/25/88       10000.00     24999.00      6.25
02/25/88       25000.00     49999.00      6.75
02/26/88       50000.00     99999.00      6.75
02/26/88      100000.00    149999.00      6.75
02/27/88      150000.00    249999.00      6.75
02/27/88      250000.00    999999.00      7.00
```

When the caller requests money market information, the VRU reads the MARKETRT screen and speaks the following messages:

A money market account from 1000 to 9999 dollars pays five point seven five percent.
A money market account from 10000 to 24999 dollars pays six point two five percent.
A money market account from 25000 to 149999 dollars pays six point seven five percent.
A money market account from 250000 to 999999 dollars pays seven point zero zero percent.

Note: Another way to search an operator screen is to use the logic while S BASE exists ALL the NEXT occurences apply. The VRU will read and speak each line without making any decisions. For an example, refer to the RATES screen in the Training and Operations Workbook, Appendix G.

12.2.1.2 Defining Screen fields

You will be required to define the first and next occurrence of the screen field S BASE. In this example S BASE is the date. The remaining fields, S LOW, S HIGH, S INT, S I1, and S I2 must then be related to S BASE. The fields O LOW and O HIGH are defined as alphanumeric fields. The interest rate is defined as screen fields S INT, S I1 and S I2. S INT is used to verify the amount of interest. S I1, and S I2 split the interest rate allowing the VRU to speak the interest rate digit by digit. For additional information on defining screen fields refer to the section describing the definition of repeating fields.

12.3 Read Operator Screen for Edit

In the following Application training the System Administrator will change the interest rates on the MARKETRT screen. The VRU will read the low and high dollar amount and ask if a change will occur. If no change occurs the VRU advances to the next line. The VRU automatically updates the date field of each changed line. When all changes are completed the VRU will write the MARKETRT screen to the hard disk.

12.3.1.1 Application Training Outline

Using a hidden selection at the main menu option the VRU directs the System Administrator to the MAINT label. The VRU will ask for the password and the type of maintenance that is required. In the following outline the VRU will search, read, and update the operator screen line by line.

```
Initial CRT screen is "BASE"
  1. Answer the telephone

  MAIN MENU SELECTION
  2. Speak a message
  3. Receieve telephone input
  4. If TI: T MAINMENU = numeric
     constant 9
     THEN: Proceed to label "MAINT"

  MAINT
  44. Speak a message:
       Speak phrase: Please enter your password.
  45. Receive telephone input
  46. If TI: T PASSWD n = numeric
      constant 12345
      THEN: Proceed to label "MAINT"
  47. Speak a message:
        Speak phrase: To update an operator screen, press 1.
  48. If TI: T MAINT = numeric constant 1
      THEN: Proceed to label "UPDATE"

  UPDATE
  75. Access operator screen
       1. Read operator screen "MARKETRT"
          for edit
          2. Process expected operator
             screen "MARKETRT"

             GET LINE
             1. If S BASE1 exists
                (repeats, ALL of the NEXT apply)
                THEN> Proceed to label "SPEAK LINE"
             2. Proceed to label "FINISH"

             SPEAK LINE
             3. Speak a message
                  Speak field: O LOW1
                  Speak phrase: to
                  Speak field: O HIGH1
                  Speak phrase: is
                  Speak field: S INT1
                  Speak phrase: point
                  Speak field: S INT2
                  Speak phrase: To change, press 1.
             4. Receive telephone input
                T OPTION
             5. If TI: T OPTION = numeric constant 1
                THEN: Proceed to label "CHANGE"
             6. Proceed to label "GET LINE"
```

```
CHANGE
7. Speak a message
     Speak phrase: Enter new rate.
8. Receive telephone input T RATE

9. Move data into operator field O RATE
   Source of data is telephone input field "T RATE".

10. Move data into operator field O INT1
    Source of data is modified operator field "O RATE".
     Modify "O RATE" by deleting 2 trailing characters.

12. Move data into operator field O INT2
    Source of data is modified operator field "O RATE".
     Modify "O RATE" by deleting the leading character.

13. Enter data on operator screen
    Enter O INT1 into screen field S INT1.
14. Enter data on operator screen
    Enter O INT2 into screen field S INT2.
15. Enter data on operator screen
    Enter system field "current date" into screen field
    S DATE1.
16. Proceed to label "GET LINE".

 FINISH
17. Access operator screen
    1. Write operator screen

18.Send CRT screen to host
   using RESET.
19. Receive CRT screen "BASE"
```

12.3.1.2 Defining Screen fields

You will be required to define the first and next occurrence of the screen field S BASE1. The remaining fields, S DATE, S LOW1, S HIGH1, S INT1, and S INT2 must then be related to S BASE1. Notice that the date field is defined twice. First as S BASE1 and again as S DATE. S INT1 and S INT2 split the interest rate to allow for the decimal place. For additional information on defining screen fields refer to the section describing the definition of repeating fields.

12.3.1.3 Updating Operator Screens

Operator screens can be updated by two methods:

Using update operator screen: Operator screens are updated and information is broadcast across the network without taking the sending and receiving VRUs off-line. To perform modifications select the Update Operator Screen option from the on-line menu. The VRU will prompt you through the update process. When indicating the screen to be updated remember to specify which sample is being changed.

Using read operator screen for edit: Operator screens are updated via telephone input during an incoming call. The VRU should be trained to accept a password in the first Receive Telephone Input step. A Make a Decision step will direct the system administrator to the edit portion of the operator screen training. The changes are written to the operator screen using the Enter data on operator screen step. When the changes are completed and verified, the admin-

istrator will send the changed screen to the hard disk via the Write operator screen step.

Chapter 13. REPEATING FIELDS

Repeating fields are used when the VRU moves up or down a list of items, searching for a specific item or searching for several items. Training repeating fields is one of the most complex training processes of the VRU.

You define repeating fields in a make a decision step in the application outline. The make a decision step would look similar to this:

```
If screen field S BASE exists, repeats, the first 1 next occurrence
applies, proceed to a label.
```

The screen field S BASE is a dummy field; that is, it is a screen field that the VRU uses to begin its search--IT IS NOT USED FOR OTHER PURPOSES SUCH AS READING THE CONTENTS OF S BASE. If you need to read or speak the contents of S BASE, you define another field related to S BASE at the same exact position on the screen. In essence, you define the same screen field twice with unique names.

The following sections describe how to search from top to bottom, from bottom to top, and how to search for different items using the same routine. Please note that following examples provide basic outlines only and they might be different depending on your application needs. The following examples use the ACCT INFO screen of the sample Company application. Refer to the screen diagram below.

```
TC106      ACCOUNT INFORMATION                    THE COMPANY     08:09:10


DATE       TCODE NUMBER   AMOUNT       LOAN BALANCE:              980.00
02/23/88    CHK   1001    67.50       CREDIT LIMIT:            5,000.00
02/24/88    CHK   1002    23.56       LAST PAYMENT:               50.00
02/25/88    CHK   1003    14.89       DATE OF PMT :            02/16/88
02/25/88    ATM           20.00       A.P.R.      :               11.00
02/25/88    WTH          100.00
02/26/88    CHK   1009   250.00
02/26/88    CHK   1010     2.45
02/27/88    ATM           50.00
02/27/88    CHK   1019    34.78       ACCT BALANCE:            1,176.43
02/27/88    CHK   1020   400.00       YTD INTEREST:               25.00
02/28/88    WTH           50.00
02/28/88    ATM           50.00
02/29/88    CHK   1021    34.50       ACCOUNT NUMBER:  1234567890
02/29/88    WTH          100.00       SSN:  518-54-2328
02/29/88    CHK   1022    23.98       NAME:  TOM HENDERSON
                                      ADDRESS:  123 WEST A ST.
                                      CITY:  PHOENIX,AZ
                                      ZIP:  85023
```

13.1 Searching From Top to Bottom For a Specific Item

To start searching at the top of a list, use the make a decision step:

```
If S BASE exists, repeats, the first 1 next occurrence applies.
```

The VRU knows where the top of the list is because S BASE's first occurrence is defined in screen field training as the first item at the top of the list.

To move down a list from S BASE's first occurrence, use a second make a decision:

```
If S BASE exists, repeats, all the next occurrences apply.
```

The VRU knows how to move down because S BASE's next occurrence is defined in screen field training as being located one line below the first occurrence; therefore, the next occurrence establishes the downward movement.

13.1.1 Application Training Outline

In the following application training, the caller wants to know the amount of check 1009. The caller depresses 1009 on the telephone and the VRU stores this value in the telephone input field, T CHK NUM. Once the VRU finds check 1009, the VRU speaks the amount and date that correspond to check 1009.

Before beginning the actual application training steps, decide which field is S BASE. Remember, you cannot use S BASE for anything other than defining the repeating field; it is a reference point to tell the VRU where to begin its search. In the following example, S BASE is the date field. Notice also that the date field is defined a second time as S DATE, so the VRU can speak this field.

```
BEGIN SEARCH
1.  If SF: S BASE exists                          Comment:  Step 1 directs
    (repeats, first 1 next occurrence apply)      the VRU to begin
    Proceed to label CHECK TRN CODE               searching.  If S BASE
                                                  does not exist, the VRU
2.  Proceed to NO FIND                            goes to step 2.

CHECK TRN CODE
3.  If SF: S TRAN CODE = "CHK" in value
        and TI: T CHK NUM = SF: S CHK NUM in value
        Proceed to SAY CHECK


FIND NEXT                                         Comment:  Step 4
4.  If SF:  S BASE exists                         directs the VRU to move
    (repeats, all of the next apply)              down the list from the
    Proceed to label CHECK TRN CODE               first occurrence of
                                                  S BASE.  The VRU will
NO FIND                                           search for S BASE up to
5.  Speak a message                               the number of times
    Compose the message to speak                  S BASE can occur on a
      Speak Phrase:  I'm sorry, but we            screen.  In this case,
      have no records of check                    up to 15.
      Speak Field:  TI:  T CHK NUM
```

```
6.  Proceed to MORE INFO

SAY CHECK
7.  Speak a message
    Compose the message to speak
      Speak phrase:  Check number
      Speak field: SF: S CHK NUM
      Speak phrase:  was processed on
      Speak field SF: S DATE
      Speak phrase:  in the amount of
      Speak field SF: S AMOUNT

MORE INFO
8. Speak a message
   Compose the message to speak
     Speak a phrase:  For additional information on this
     account, press 1.
```

13.1.2 Defining Screen Fields

Screen field training for searching down a list requires that you define S BASE's first and next occurrences. All the remaining screen fields, S TRAN CODE, S AMOUNT, S CHK NUM, and S DATE must be related to S BASE. In this manner, when the VRU moves down the list of S BASE, it can also read or check the values of the related fields that correspond to S BASE, no matter where in the list the VRU is. The VRU moves down the list a maximum number of times that S BASE can occur on a single screen, defined in the NEXT occurrence of S BASE.

13.1.2.1 Base field

S BASE 8 Alphanumeric

First occurrence:

1. A field used only for getting data.
2. Having a label.
3. The start of its data is always located 1 line below the start of its label.
4. The end of its data is 7 characters to the right.

Next occurrence:

1. A field used only for getting data.
2. S BASE can have a maximum of 15 occurrences on the screen and CANNOT occur on multiple pages.
3. It is always located in the same position on the screen. The start of its field is 1 line below the start of its last occurrence.
4. The end of its data is 7 characters to the right.

13.1.2.2 Related fields

S DATE 8 A date MM/DD/YY

First occurrence:

1. A field used only for getting data.
2. Being related to field "S BASE".
3. The start of its data is 0 line below the first occurrence of "S BASE".
4. The end of its field is 7 characters to the right.

S TRAN CODE 3 Alphanumeric
First occurrence:
1. A field used only for getting data.
2. Being related to field "S BASE".
   It is always located in the same position on the screen.
3. The start of its data is 12 characters to the right
   of the start of "S BASE".
4. The end of its data is 2 characters to the right.

S AMOUNT 10 A dollar and cents amount DDD.CC
First occurrence:
1. A field used only for getting data.
2. Being related to field "S BASE".
3. It is always located in the same position on the screen.
   The start of its data is 25 characters to the right
   of the start of "S BASE".
4. The end of its data is 9 characters to the right.

S CHK NUM 4 Numeric
First occurrence:
1. A field used only for getting data.
2. Being related to field "S BASE".
3. It is always located in the same position on the screen.
   The start of its data is 19 characters to the right
   of the start of "S BASE".
4. The end of its data is 3 characters to the right.

13.2 Searching From Bottom to Top for Last Three Items

To start searching at the bottom of a list, use the make a decision step:

```
If S BASE exists, repeats, the last 1 next occurrences applies.
```

The VRU knows where the last occurrence of S BASE is because: 1) S BASE's first occurrence is at the top of the list; 2) S BASE can occur 15 times on a screen; 3) therefore S BASE's last occurrence is the 15th occurrence.

To move up from the bottom of the list, use a second make a decision step:

```
If S BASE exists, repeats, the first 1 previous occurrence applies.
```

S BASE's previous occurrence is defined in screen field training as being one line above the next occurrence; therefore, the previous occurrence establishes the upward movement.

13.2.1 Application Training Outline

In the following example, the caller has asked for information on the last three checks that have cleared his account. The VRU searches the account information screen and once it has found the last three checks, the VRU will speak the amount(s), date(s), and check number(s) corresponding to each check. A counter tracks the number of checks found. The counter is updated each time the VRU loops through the second decision in the search process.

```
FIND LAST CHECK
1. Move data into an operator field
      move numeric constant 0 in
      OF: 0 COUNTER

2. Make a decision
      IF: screen field S BASE exists          Comment:  Step 2 directs
      (repeats, the LAST 1 NEXT               the VRU to begin
      occurrences apply).                     searching.  If S BASE
      THEN: Proceed to label CHECK CODE       does not exist, the VRU
                                              goes to step 3.

3. Proceed to label HOW MANY CHECKS

CHECK CODE
4. Make a decision
      IF: SF: S CODE = CHK in value
      THEN: Proceed to label SAY CHECK

5. Proceed to label FIND NEXT CHECK           Comment: Step 5 sends the
                                              VRU to the next search
                                              make a decision step,
                                              so that the VRU will search
                                              up the list for checking
SAY CHECK                                     transactions.
6. Make a decision
      IF: OF: 0 COUNTER = 0 in value
      THEN: Speak a message
         Speak phrase: your most recent checks were

7. Speak a message
      Speak phrase: check number
      Speak field:  SF: S CHK NBR
      Speak phrase: was processed on
      Speak field:  SF: S CHK DATE
      Speak phrase: in the amount of
      Speak field:  SF: S CHK AMT

8. Move data into an operator field
      move modified operator field 0 COUNTER into
      operator field 0 COUNTER, modify field 0 COUNTER
      by adding numeric constant 1.
```

```
9. Make a decision
      IF: OF: 0 COUNTER = 3 in value
      THEN: Proceed to label MORE INFO?

FIND NEXT CHECK
10. Make a decision
       IF: SF: S BASE exists                  Comment: Step 10 directs the VRU
       (repeats, the FIRST 1 PREVIOUS         to search the list for the
       occurrences apply)                     previous occurrence.  The VRU will
       THEN: Proceed to label CHECK CODE      search the list the maximum
                                              number of times S BASE
                                              can occur on the screen.
HOW MANY CHECKS
11. Make a decision
       IF: OF: 0 COUNTER = 0 in value
       THEN: Speak a message
             Speak phrase: no checks have cleared in this
                           period.

12. Make a decision
       IF: OF: 0 COUNTER = 1 in value
       THEN: Speak a message
             Speak phrase: this was the only check cleared.

13. Make a decision
       IF: OF: 0 COUNTER = 2 in value
       THEN: Speak a message
             Speak phrase: only two checks have cleared in
                           this period.
MORE INFO?
14. Speak a message
       Speak phrase: For additional information on this
                     account, press 1.
```

13.2.2 Defining Screen fields

Screen field training for searching upward from the bottom of a list requires that you define S BASE's first, next, and previous occurrences. The remaining screen fields, S CHK DATE, S TCODE, S CHK AMT, S CHK NBR must be related to S BASE. In this example the repeating field S BASE is the date field. For the VRU to speak that date, the field must also be defined as S CHK DATE.

13.2.2.1 Base field

S BASE 8 characters Alphanumeric
First occurrence:
1. A field used only for getting data.
2. Having a label.
3. The start of its data is always located 1 line below the start of its label.
4. The end of its data is 7 characters to the right.

Next occurrence:
1. A field used only for getting data.
2. S BASE can have a maximum of 15 occurrences on
3. The screen and CANNOT occur on multiple pages.
4. It is always located in the same position on the screen. The start of its field is 1 lines below the start of its last occurrence.
5. The end of its data is 7 characters to the right.

```
Previous occurrence:
1. A field used only for getting data.
2. It is always located in the same position on the
    screen.  The start of its field is 1 lines above the
    start of its next occurrence.
3. The end of its data is 7 characters to the right.
```

13.2.2.2 Related fields

See 13.1.2.2, "Related fields" on page 13-3.

13.3 Searching From Top to Bottom For Different Items

You now know how to begin a search from the top and bottom of a list. To go a step further, the following application outline demonstrates how to use one routine to search for different items one at a time.

13.3.1 Application Training Outline

In the following example the caller can request information on one of three transactions. This can be either the first check, the first ATM transaction, or the first withdrawal during the current period. The VRU searches the account information screen for the transaction. Once the VRU finds the transaction, it speaks that specific information to the caller. If the caller chooses another transaction, the VRU returns to the initial search step and begins its search from the top of the list.

```
ASK TRANSACTION
1. Speak a message
      Speak phrase:  For information on first withdrawal, press 1.
      Speak phrase:  For information on first ATM transaction, press 2.
      Speak phrase:  For information on first check, press 3.

2. Receive telephone input field T TRANS

3. Move data into operator field              Comment:  Step 3 translates
   move modified T TRANS into 0 TRANS         T TRANS to the following:
   modify by translating                      1 to withdrawal; 2 to ATM
                                              transaction; and 3 to check.
BEGIN SEARCH                                  The VRU uses these translated
4. Make a decision                            values to speak the trans-
      IF: screen field S BASE exists          action to the caller.
      (repeats, the first 1 occurrences
      apply).
      THEN: Proceed to label CHECK T TRANS

5.  Proceed to NO FIND
```

```
CHECK T TRANS
6. Make a decision
      IF: TI: T TRANS = 1 in value
      THEN: Proceed to PROCESS 1

7. Make a decision
      IF: TI: T TRANS = 2 in value
      THEN: Proceed to PROCESS 2

8. Make a decision
      IF: TI: T TRANS = 3 in value
      THEN: Proceed to PROCESS 3

PROCESS 1
9. Make a decision
      IF: screen field S TCODE = WTH
      THEN:  Proceed to SAY TRANS

10. Proceed to label SEARCH AGAIN

PROCESS 2
11. Make a decision
      IF: screen field S TCODE = ATM
      THEN:  Proceed to SAY TRANS

12. Proceed to label SEARCH AGAIN

PROCESS 3
13. Make a decision
      IF: screen field S TCODE = CHK
      THEN:  Proceed to SAY TRANS

SEARCH AGAIN
14. Make a decision
      IF: screen field S BASE exists,
      repeats, all the next occurrences
      apply.
      THEN: Proceed to label CHECK T TRANS

NO FIND
15.  Speak a message
     Compose the message to speak
       Speak phrase:  I'm sorry, but there are no records for
       this transaction.

16. Proceed to CHECK ANOTHER.
```

```
SAY TRANS
17.  Speak a message
        Speak phrase: Your most recent
        Speak field:  "O TRANS"
        Speak phrase: was processed on
        Speak field:  "S DATE"
        Speak phrase: in the amount of
        Speak field:  "S AMOUNT"

CHECK ANOTHER
18. Speak a message
       Speak phrase: To check another transaction,
                     press 1.

19. Receive telephone input field T ANOTHER CK

20. Make a decision
       IF: telephone input field T ANOTHER CK = 1
       THEN: Proceed to label ASK TRANSACTION
```

13.3.2 Defining Screen fields

See 13.1.2, "Defining Screen Fields" on page 13-3.

13.4 Points to remember

- Base field searches

  If S BASE exists, repeats, the first 1 next occurrence applies. Used to begin a search at the top of a list. Definition of the base screen field's first occurrence determines the top of the list.

  If S BASE exists, repeats, all the next occurrences apply. Used to move down the list from the top. Definition of base screen field's next occurrence determines that the VRU moves down the list.

  If S BASE exists, repeats, the last 1 occurrence applies. Used to begin a search at the bottom of list. The VRU determines the last occurrence (or bottom of a list) by 1) first occurrence definition and 2) how many times the base screen field can occur on a screen.

  If S BASE exists, repeats, the first 1 previous occurrence applies. Used to move up the list from the bottom. Definition of base screen field's previous occurrence determines that the VRU moves up the list.

  While S BASE exists, repeats, all the next apply. Used ONLY if the make a decision is true for each item of the list. For example, if the application screen contains one column of checking transactions only and you want to speak this information to the caller, then you use:

  ```
  While S BASE exists, repeats, all the next apply, then speak a message.
  ```

- Base field searches every other line

  To search every other line (skip 1 line), you would use the same screen field training and the same make a decisions steps described in the example application outlines, except that you would use the number 2 instead of 1 in the make a decision steps. The number 2 tells the VRU to search every second line. For example:

```
If S BASE exists, repeats, the first 2 next occurrences apply.
```

- Naming screen fields

  When you have multiple search routines for the same screen, the names for each base and related screen fields MUST be unique. For example, speaking a specific check and the last three checks requires two routines. Each routine has unique screen field names defined in application training and screen field training.

	Specific check	Last three checks
Base field	S BASE	S BASE L3
Related field	S DATE	S DATE L3
Related field	S CHECK	S CHECK L3

Chapter 14. PAGING

The VRU supports manual and automatic paging. You choose manual or automatic paging depending on the host application. Manual paging means that the application user presses keys to move forward or backward through multiple pages of the same screen. Automatic paging means that the user does not press any key, but the host automatically pages for the user. The following sections describe how to define manual and automatic paging in the VRU.

14.1 Manual Paging

Paging directly corresponds to repeating fields. When you define the next occurrence of a repeating field in screen field training, the VRU asks if the field can occur on multiple pages of a screen. For manual paging, you must answer NO to this question. You define manual paging in the application outline by including steps that tell the VRU how to page forward and backward.

Application training steps that define manual paging directly relate to the make a decision step containing the repeating field. For example, if the repeating field is not found on a screen, the subsequent logical steps should access the next page, then search for the repeating field again on this new page. The VRU continues this process of searching and paging until it finds a match or until there are no more pages of that particular screen. The VRU will know it has reached the last page of a screen by some identifier, such as a screen field that contains the words "last page."

14.1.1 Application Training Outline

The following application training describes searching for the last three checks that might span more than one page. The VRU first must access the last page of the screen, then begin its search routine. The last page identifier is a screen field that contains the words "last page"; the first page identifier, "first page." There are no identifiers in the middle pages. Please note that the repeating field logic is derived from the previous section, "Repeating Fields."

```
FIND LAST CHECK
1. Move data into an operator field
      move numeric constant 0 in
      OF: 0 COUNTER

GET LAST PAGE
2. Make a decision
       IF:  SF: S PAGE = alphanumeric constant LAST PAGE
       THEN: Proceed to label BEGIN SEARCH

3. Send screen ACCT INFO to host using PF2
```

```
4. Receive screen ACCT INFO                Comment:  The VRU continues to
    1.  Process expected screen            send and receive ACCT INFO
        1.  Proceed to GET LAST PAGE       until it sees LAST PAGE.  When
                                           the VRU sees LAST PAGE, it pro-
BEGIN SEARCH                               ceeds to BEGIN SEARCH.
5. Make a decision
      IF: screen field S BASE exists
      (repeats, the LAST 1 NEXT
      occurrences apply).
      THEN: Proceed to label CHECK CODE

6.  Proceed to GET PREV PAGE

CHECK CODE
7. Make a decision
      IF: SF: S CODE = CHK in value
      THEN: Proceed to label SAY CHECK

8. Proceed to label FIND NEXT CHECK


SAY CHECK
9. Make a decision
      IF: OF: O COUNTER = 0 in value
      THEN: Speak a message
         Speak phrase: your most recent checks were

10. Speak a message
      Speak phrase: check number
      Speak field:  SF: S CHK NBR
      Speak phrase: was processed on
      Speak field:  SF: S CHK DATE
      Speak phrase: in the amount of
      Speak field:  SF: S CHK AMT

11. Move data into an operator field
      move modified operator field O COUNTER into
      operator field O COUNTER, modify field O COUNTER
      by adding numeric constant 1.

12. Make a decision
      IF: OF: O COUNTER = 3 in value
      THEN: Proceed to label MORE INFO?

FIND NEXT CHECK
13. Make a decision
       IF: SF: S BASE exists
       (repeats, the FIRST 1 PREVIOUS
       occurrences apply)
       THEN: Proceed to label CHECK CODE

GET PREV PAGE
14. Make a decision
       IF:  SF: S PAGE = alphanumeric constant FIRST PAGE
       THEN: Proceed to label HOW MANY CHECKS

15. Send screen ACCT INFO to host using PF3
```

```
16. Receive screen ACCT INFO
    1.  Process expected screen
        1.  Proceed to FIND NEXT CHECK

HOW MANY CHECKS
17. Make a decision
       IF: OF: 0 COUNTER = 0 in value
       THEN: Speak a message
             Speak phrase: no checks have cleared in this
                           period.

18. Make a decision
       IF: OF: 0 COUNTER = 1 in value
       THEN: Speak a message
             Speak phrase: this was the only check cleared.

19. Make a decision
       IF: OF: 0 COUNTER = 2 in value
       THEN: Speak a message
             Speak phrase: only two checks have cleared in
                           this period.
MORE INFO?
20. Speak a message
       Speak phrase: For additional information on this
                     account, press 1.
```

14.2 Automatic Paging

You specify automatic paging in screen field training by answering YES to the prompt which asks if the next occurrence of the repeating field can occur on multiple pages of a screen. After answering YES to this prompt, the "paging" option displays on the SCREEN TRAINING OUTLINE screen:

```
SCREEN TRAINING OUTLINE
*1.  ACCT INFO
     1.  Screen identification method
     2.  Screen fields
    *3.  Paging method









Select function (Delete/Expand/Return)
```

Expand the paging option to define automatic paging. The VRU displays a series of options and questions that can be categorized as: 1) how the VRU requests

the next and previous pages, and 2) how the VRU detects the last and first pages. Each of these categories includes a variety of options and questions as described below.

Note: You define all automatic paging by answering the questions and prompts in screen field training as described below. You specify no steps in the application outline for automatic paging. Therefore, the application outline for automatic paging does not have the steps listed under the labels, GET LAST PAGE and GET PREV PAGE. In essence, the application outline appears no different from the outlines already described in the previous section, "Repeating Fields."

14.2.1 How the VRU requests the next and previous pages.

Select one of the following three options to define how the VRU pages forward and backward:

1. **Send a command to the main computer.**

   Select this option if the host uses a command such as "next page" to page forward. You must answer the following questions: 1) What is the command? 2) In which screen field is the command entered? 3) Which AID key is used for sending the command to the host?

2. **Press a special key.**

   Select this option if host uses only an AID key for paging. The VRU prompts you for the appropriate AID key.

3. **Modify a screen field and put it in another screen field.**

   Select this option if the screen has a numeric field that the host adds to or subtracts from to page forward or backward. You must answer the following questions: 1) What screen field contains the number? 2) Does the VRU add or subtract from the screen field? 3) What is the constant used for adding or subtracting? 4) In which screen field will the VRU put the modified (added or subtracted) contents? 5) What AID key is used for sending the screen?

14.2.2 How the VRU detects the last and first pages.

Once you have selected one of the above options for both the next and previous pages and have answered the corresponding questions, you then define how the VRU detects the last and first pages. You have two options:

1. **The last (or first) page tells me so.**

   Select this option if there is a screen field which indicates the last or first page. The VRU provides two screen field options: 1) a unique field or 2) a field that specifies Nth of N pages. No matter which of these two options you choose, the VRU prompts you to define these fields exactly as you define other fields in screen field training. The VRU automatically names the fields, LAST PAGE LABEL and FIRST PAGE LABEL.

2. **The number of pages is fixed.**

   Select this option if the application has a predetermined number of pages. The VRU will know the last page by the number you specify. You now define the first page by: 1) a unique field or 2) a field that specifies Nth of N pages. No matter which option of these two options you choose, the VRU prompts you to define these fields exactly as you define other fields in screen field training. The VRU automatically names the fields, LAST PAGE LABEL and FIRST PAGE LABEL.

Chapter 15. TRANSLATION TABLES

The VRU uses translation tables to translate one value to another value. The sample Company application exemplifies translating an operator field that contains a system id (serial number) and line number to a unique password. In this manner, each VRU line has a unique password for logging on to the host.

You perform two basic procedures for translating values in the VRU:

1. Identify the data that you want translated in the application outline.
2. Translate the identified data to new values in VRU Translation Table Training.

Identify the Data: There are two application outline steps that you can use for identifying the data that you want translated.

```
Move data into an operator field
    OR
Enter data on CRT screen
```

When you expand the "source of data" substep of the operator field or the CRT screen, a step list appears. Select one of the "modified" fields (displayed below) from the step list. Only the "modified" fields can be used for translating, because the VRU modifies the field by translating it to a new value.

```
Modified telephone input
Modified operator field
Modified screen field
Modified system field
```

Once you have selected one of the modified fields, expand the substep. A new step list appears on the screen providing multiple options for modifying fields. Now select the option to "translate a field." Expand the "translate a field" substep and specify the name of the translation table.

Translate the Data: You define the translated values in the VRU Translation Table Training option under the Application Training Menu. Because you already specified the translation table name in the application outline, the name already appears here. Expand the name, then use the insert function to insert the original and translated values in the translation table.

The following two examples demonstrate how to use translation tables to create unique logon passwords and to validate telephone input.

15.1 Using a Translation Table for Logon Passwords

In the following example, the VRU logs on the host with a unique password for each of its lines. Remember, each VRU line represents a separate terminal. In this example, the operator field O SYS ID contains data that is modified twice: 1) the VRU system id is modified by appending the line number, and 2) the combined VRU system id and line number are translated to a password.

If you do not have a network of VRUs, only the VRU line number is required to be translated to a unique password.

15.1.1 Application Training Outline

1. Move data into operator field 0 LINE Source of data is a system field "line number"	Comment: 0 LINE establishes the operator field containing the line number.
2. Move data into operator field 0 SYS ID Source of data is a modified system field "system id" Modify system field "system id" by appending 0 LINE	Comment: 0 SYS ID contains the system id (serial number) appended by the VRU line number (0 LINE).
3. Enter data on CRT Screen Source of data is modified operator field 0 SYS ID Modify 0 SYS ID by translate a field Translation table name is PASSWORD	Comment: Step 3 translates 0 SYS ID using the values defined in the VRU translation table, PASSWORD.

Note: Steps 1 and 2 can actually be eliminated and can be included in step 3. For example, the "source of data" substep of the CRT screen field can be a modified system field "system id" that is modified by appending the system field "line number." You then can add the modified system field substep again, and then modify it by translating a field. Experiment!

15.1.1.1 VRU Translation Table Training

Once you have completed the application outline steps for translating fields, return to the Application Training Menu and select the option for VRU Translation Table Training. The translation table name that you specified in the application outline displays. Expand the table name then use the insert function to define single translated values.

Note that in 89-02000451 in the screen example below, 89-0200045 is the system id (serial number displayed in Disk Utilities). The number 1 appended to 89-0200045 is the VRU line number. If the VRU goes down the list of values and cannot make a match, the VRU will try to make a translation in the system default, "No preceding rules apply." In this example, there is no value for "No preceding rules apply" and therefore the VRU will go to the next step in the application outline.

```
                VRU TRANSLATION TABLE PASSWORD

    1.  "89-02000451"                  -> "RUDOLPH"
    2.  "89-02000452"                  -> "DANCER"
    3.  "89-02000453"                  -> "PRANCER"
    4.  "89-02000454"                  -> "COMET"
    5.  No preceding rules apply       -> "(Missing translated value)"









Select 1 to define a single input translation
Select 2 to define a range of input translation
Select 3 to define a default translation
```

15.2 Using a Translation Table for Validation

In the following example, the VRU uses a translation table to translate a caller's telephone input to the number 1 if the telephone input matches one of 20 host-acceptable codes. If the VRU does not find a match, it translates the telephone input to 0, specified in the system default "No preceding rules apply." The VRU can now make decisions on how to proceed in the application outline based on values of 1 or 0.

15.2.1 Application Training Outline

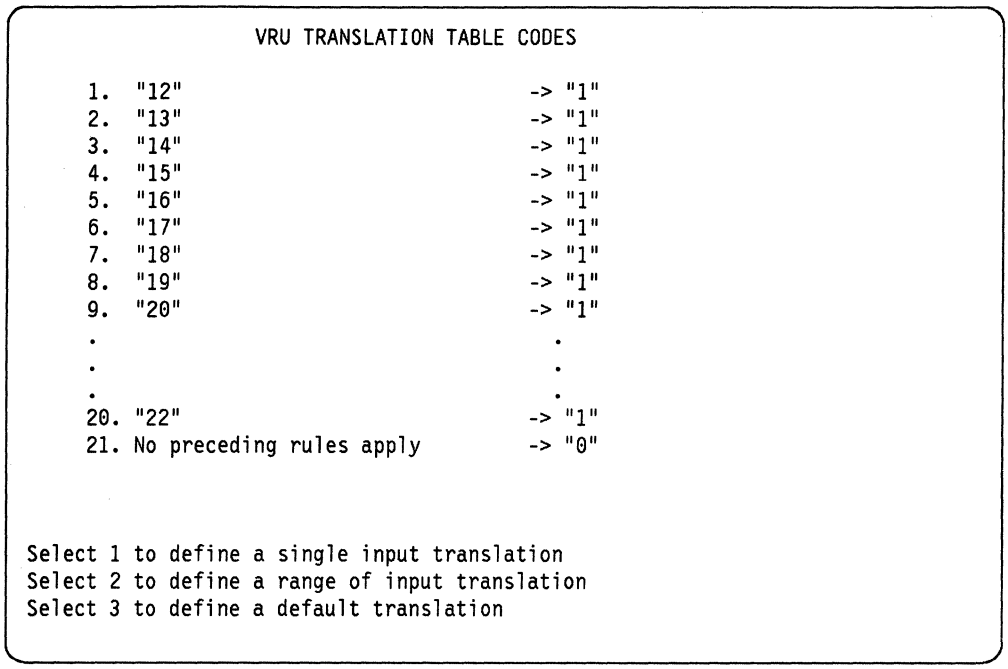
```
3.  Move data into operator field 0 CODE          Comment:  Step 3
       Source of data is a modified telephone     translates the
       input "T CODE"                             telephone input to
         Modify telephone input by translate      either a 1 or 0.
         a field
           Translation table is CODES

4.   IF:  operator field (0 CODE) = numeric       Comment:  Remember,
     constant (1) in value                        1 represents an
     THEN:  proceed to CONTINUE TRANS             acceptable code.

5.   If:  operator field (0 CODE) = numeric
     constant (0) in value
     THEN: proceed to OTHER TRANS
```

15.2.1.1 VRU Translation Table Training

The following translation table is different from the password translation table in that each valid entry is translated to 1. If none of the above rules apply, you define a default translation to 0.



15.2.1.2 Points to remember

- To automatically add the translated values as required speech items in Speech Training, answer yes to the prompt, "Will translated values from the table be spoken?"
- When inserting a screen field value in the translation table, ensure that you include as many characters and spaces that screen field can contain. For example, if the screen field is the word "Jan" followed by two spaces, then you must insert "Jan " in the translation table. Ensure that the case (lower and upper) matches the screen field.
- If you are inserting values in a translation table that will be spoken in a foreign language, do not include the language indicator as part of the translated value. That is, if you translate "Thursday" to the Spanish word "Jueves," do not specify the Spanish indicator {S} before "Jueves." The VRU will automatically place the {S} before "Jueves" in Speech training if you answer yes to the prompt, "Will translated values from the table be spoken?" If you answer no to this prompt, then you must add **{S}Jueves** to Speech Training.

Chapter 16. FOREIGN LANGUAGES

To have the VRU generate foreign language numbers, dates, times, and alphabetic characters in the vocabulary list, you must create an operator field named LANGUAGE. Note that this field name is **not** preceded with the letter O, an identification technique recommended for naming operator fields.

The source of the LANGUAGE operator field should be one of these constants: SPANISH, JAPANESE, FRENCH, UNITED KINGDOM. The step creating the LANGUAGE operator field must be located after the answer telephone step.

The VRU also generates monetary amounts in the vocabulary list for U.S. and U.K. English, Canadian French or Spanish when the LANGUAGE operator field is present. It does not generate monetary amounts for French and Japanese. You must add them by identifying or creating fields that contain the currency amounts and then building those fields into speak a message steps. See the example under Monolingual Systems.

The VRU generates the pre-coded Exception Processing messages in English only, regardless of the contents of the LANGUAGE operator field. You must create those messages for any additional language(s). See the example under Exception Processing.

16.1 Foreign Language Indicators

All foreign language items that the VRU generates in the vocabulary list have a language indicator. You must add the same indicator to all foreign language speak a message steps. Vocabulary items with a language indicator are grouped together in the list.

The language indicators are:

Indicator	Language
F	French
S	Spanish
J	Japanese

Enclose the language indicator with curled brackets and place it at the beginning of each message that requires an indicator.

For example, if the speak a message is in Spanish, then place {S} before the phrase:

```
Speak a message
  Speak phrase:  {S}Buenos dias.
```

The number of languages you will be able to use is dependent on the size of the hard disk, size of the application, and the size of the voice files.

16.2 Speaking Fields

The speak a message step that includes a screen field, operator field, or translated field is the same in English and in foreign languages. That is, you do not add a language indicator to the screen field, operator field, or translated field. However, when you add the screen field, operator field, or translated field to voice vocabulary, you must place the language indicator before it as shown in the screen field example below.

Remember that the VRU is case sensitive. If a screen field source is in upper case, add it to the vocabulary list in upper case.

16.2.1.1 Screen Field Example

Host screen: The source for screen field S DAY is JUEVES, which is THURSDAY in Spanish.

```
to1361          LA COMPANIA            JUEVES      10/26/89
```

Application training outline

```
1. Answer the telephone
2. Move data into operator field
     The source of data is an Alphanumeric constant "SPANISH".
     The operator field name is "LANGUAGE".
3. Speak a message
   Speak phrase: {S}Today is
   Speak field:  "S DAY"
   Speak field:  "S DATE"
```

Voice vocabulary: Enter the screen field source (contents) exactly as follows:

```
{S}JUEVES
```

16.2.1.2 Translated Operator Field Example

Host screen: The translation table for screen field S DAY translates the number 5 to Jueves.

```
CHILD       SCHOOL #       DAY       HOME #
Sue Brown   256            5         756-4130
```

Application training outline

```
Speak a message
   Speak phrase: {S}Your child missed school on
   Speak field:  "O DAY"
   Speak phrase: {S}please call the office.
```

Voice vocabulary: You enter the translated operator field exactly as follows:

```
{S}Jueves
```

16.3 Monolingual Systems

In most cases the only special action you will take is to create a LANGUAGE operator field. For Japanese and French systems, you must define the monetary units as fields and add them to spoken messages.

Application training outline

```
1. Answer the telephone
2. Move data into operator field
     The source of data is an Alphanumeric constant "FRENCH".
     The operator field name is "LANGUAGE".
3. Speak a message
      Speak phrase:  {F}Your current balance is
      Speak field:   "S FRANCS"
      Speak phrase:  {F}francs and
      Speak field:   "S CENTIMES"
      Speak phrase:  {F}centimes.
```

16.4 Bilingual Systems

Code one application with unique speaks for each language required. Before speaking, make a decision indicating the chosen language. Base the decision on the telephone input response to the first speak.

Application training outline

```
1. Answer the telephone
2. Move data into operator field
      The source of data is an Alphanumeric constant "SPANISH"
      The operator field is LANGUAGE.
3. ASK LANGUAGE
      Speak a message
      Speak phrase:  Press 1 for English
      Speak phrase:  {S}Press 2 for Spanish
4. Receive telephone input field "T LANGUAGE"
5. ASK ACCT NUM
   Make a decision
      IF:  telephone input field (T LANGUAGE) = numeric constant (2)
      in value.
      THEN:  Speak a message
             {S}Please enter your four digit account number.
6. Make a decision
      IF:  telephone input field (T LANGUAGE) = numeric constant (1)
      in value.
      THEN:  Speak a message
             Please enter your four digit account number.
7. Receive telephone input field
```

16.4.1 Exception Processing

The system files contain pre-coded spoken messages in several areas of exception processing. In a bilingual system you must add a decision step indicating the language to speak and spoken message(s) for the additional language(s).

Application training outline

```
3. Receive telephone input
     1. Make a decision
          IF: telephone input field (T LANGUAGE) = numeric constant (2)
          in value.
          THEN: Speak a message
          Speak phrase:  {S}Information needs to be
                         entered using a touch-tone telephone within
                         the time allowed.
     2. Make a decision
          IF: telephone input field (T LANGUAGE) = numeric constant (1)
          in value.
          THEN: Speak a message
          Speak phrase:  Information needs to be entered using a
                         touch-tone telephone within the time allowed.
```

Appendix A. Questions and Answers

The following questions have been selected from the INFO system. The items are dated and have keywords within the parentheses. With new VRU products and publications becoming available, the page references specified in some items may not be accurate.

1. QUESTION: FEB90 (model 40, diskettes)

   How do you Transfer Training from 9270 Mdl 1 to 9270 Mdl 40? If downloading is the answer, how do you connect the units and what screens do you change in the 9270?

   ANSWER:
   The 9270 model 01 uses a High Capacity 5 1/4 inch diskettes while the 9270 model 40 uses High Capacity (2 Meg; 1.44 Meg formatted) 3 1/2 inch diskettes. You can transfer the voice and application training files across the VRU LAN. Down loading to different media is not the answer.

   You do not have to change any screens; the same VRU application will run in different VRU models.

   -

2. QUESTION: FEB90 (extended attributes, EABs, 3270)

   I do understand that the 9270 only support the 3270 standard data stream. What I do NOT understand is what happens exactly when the 9270 is interacting with an application which DOES support EAB's. For example does the VRU "read" the field data byte-for-byte and, therefore, does the VRU programmer have to accommodate that extra byte somehow whether or not that byte is "understood" by the VRU? or are the EAB's resolved at the control unit and, therefore, the VRU "sees" nothing and the EAB's are ignored? Does this vary depending on the EAB's supported by the application(s)? Most likely in a case like this the caller might not care if the data is being displayed blinking, or in reverse video or underscored. Any information to help me help the customer understand would be appreciated. An IBM solution is dependent on how we can handle this. Thanks.

   ANSWER:
   This is a good question. There are a number of factors to consider.

   (1) The terminal controller should have the appropriate customization for a CUT terminal using the standard 3270 data stream.

   (2) VTAM/NCP should have an appropriate DLOGMOD entry for a CUT terminal using the standard 3270 data stream.

   (3) The host application should enforce the appropriate agreement with the terminal session.

   Using CICS as an example, if the VTAM defaults permitted extended attributes, the TCT entry could override VTAM and restrict the session

to a standard data stream. In a similar fashion, if the VTAM specification was correct, the CICS definitions in the TCT entry could permit (i.e., not override) the correct session flows. Your application may have the capability, as CICS does in this example, to not override when it should or to override when it should not.

If the 9270 actually received an extended attribute data stream, I think it would choke (sense code, etc.). The only way to verify how the components are working together in your particular installation would be for you to run a VTAM buffer trace and check the Logon, Bind and Bind response.

If the trace shows that extended attributes will flow on that session, you must double check the VTAM defaults or the applications definitions which are overriding VTAM. You may be able to correctly tailor the application and VTAM to suit your requirements for a standard 3270 data stream. There is no single answer to cover all possible host application environments.

- -

3. QUESTION: FEB90 (logon, protect data)

   I know that the VRU must LOGON to the host application, but what additional protection can be provided for sensitive end-user records that are accessed by callers ?

   ANSWER:
   Additional protection of sensitive personal data can be designed into the VRU application. For example, say the callers identify themselves with an 8 digit identification number (or case number). A caller who inadvertently transposes 2 digits while entering this information could be entering a valid ID for some other customer. The caller should listen to the VRU speak the ID number that was entered and be given a chance to verify that it is correct. An additional level of interrogation in the application could request a password, a PIN, the last four digits of the callers home phone or the last four digits of the SS number, which could be verified against data in the record obtained from the host. The caller can be limited to a specified number of attempts to correctly enter the identification number and associated password.

   The VRU application training could also log records to help monitor the number of failed attempts by callers to correctly identify themselves.

   -

4. QUESTION: FEB90 (HOST DOWN, operator fields)

   My customer's environment includes periodic (and limited) access to the host. Doesn't this limit the usefulness of a VRU ? What can the VRU do in a HOST DOWN condition ?

   ANSWER:
   The limit may be in your imagination, not in the VRU. It is true

that the VRU accesses host data during a HOST UP condition. The data obtained from the host can be used to construct/update Operator Screens. The information on these Operator Screens remains available to callers even during the HOST DOWN condition. In fact, it is possible to design a VRU application that only responds to callers during a HOST DOWN condition and which uses periodic HOST UP conditions to update its information.

In this example, it may be appropriate to inform the caller of the date and time that the quoted information was last updated.

- -

5. QUESTION: FEB90 (VRU FAX)

   Does the IBM 9270 or the 9274 support a FAX function ?

   ANSWER:
   No, IBM has not announced a FAX capability with any of its VRU models.

   -

6. QUESTION: JAN90 (pubs, 9274)

   There are no pubs listed in HONE, and the Salesmanual says no pubs are shipped with the product. Have any been written and will they be available with 1Q90 GA of the 9274 ?

   ANSWER:
   No Pubs were automatically shipped with the 9270 either. Pubs are ordered and shipped separately. The 9274 will have the following publications available at GA:

System Administrator Training and Operations Guide	SU31-0041
System Administrator Training and Operations Workbook	SU31-0042
Planning, Installation, and Maintenance Guide (9274)	SA38-1001
General Information (9274)	GA38-1000

   The updated Guide and Workbook will apply to the 9270/9274.

   -

7. QUESTION: JAN90 (9274, cables)

   What and how many cables are shipped with the 9274 (i.e., telephone, VRU LAN network cables, coax, and what lengths) ?

   ANSWER:
   Twelve, 6 conductor, modular telephone cables are included.
   A power cord is also included.

   The requisite cables for connection from the VRU to the host must be ordered separately. The cable configuration for the V.24 or V.35 host cables is provided in the 9274 VRU Planning, Installation and Maintenance Guide, SA38-1001, to facilitate building custom length

cables. The 9274 PIM Guide will be available when the 9274 is available. The two host cables which are offered are:

RS-232C (V.24)	Feature #1012	P/N 6423153	6 meters
V.35	Feature #1013	P/N 6423325	6 meters

- -

8. QUESTION: JAN90 (documenting VRU application)

   Is there a publication which describes recommended documentation for VRU applications? My customer has developed several applications for the VRU and it has become apparent that some formal documentation of the VRU applications needs to be done. Any suggestions would be appreciated. Thank you.

   ANSWER:
   For customers with multiple VRU applications, create a folder for each application containing the following:

   (1) 2 sets of backup diskettes (application and voice)
   (2) Application listing and prints of host screens
   (3) Application Overview sheet with:
      a). the application purpose and description (1 paragraph to 2 pages)
      b). name of application developer and/or backup
      c). name of person used for the voice training
      d). date application completed
      e). number of VRU system units and online phone numbers
      f). description of VRU Network (optional)
      g). date and descriptions of application/voice modifications

   I think the above recommendations will be a good start.

   -

9. QUESTION: JAN90 (9274, host link)

   Can the 9274 VRU Model 80 support more than one upstream link to the 37X5 for backup and additional capacity ?

   ANSWER:
   No, the 9274 supports a single host link.

   -

10. QUESTION: FEB90 (remote access)

    Users would like to remotely access the VRU 9270 and retrieve status info on the number of calls. Can this information be retrieved either by phone or through a host application?

    ANSWER:
    You cannot remotely access a 9270 VRU to retrieve statistics from another location outside the building housing the 9270. If you trained the VRU application to update the host at call completion, then the

information you want may be available to a remote PC which dials the host. This facility, if provided, would be a user responsibility.

- -

11. QUESTION: FEB90 (LAN network, ports, CRT mode)

    Customer is running a two VRU network, tied together via port 1 on each VRU. They cannot do "NORMAL CRT MODE" from ports 1 or 2 on either VRU. This causes difficulty when trying to do debugging of unrecognized screens, as we cannot get to these ports to step through the recovery. Is this a design problem or could there be something wrong with the VRU's?

    ANSWER:
    For port one, you have a LAN/Terminal coax connector which may be used for one of these functions. If you select the LAN function, it is unavailable for the Terminal connection. The same holds true for the second (and last) station on your LAN, (i.e., port one is tied up for the LAN connection).

    The console terminal should work when it is attached to ports 2, 3 or 4. Make sure that the Terminal Enable switch is in the UP position for ENABLE. You only need one available port for an operational console.

    When in Debug mode, and with the Terminal connected to port 4, you can disable lines 1, 2 and 3 and force the call to be handled by port 4. In this manner, you should be able to observe the testing of the Screen processing. Alternatively, you can specify which of the four sessions you want to observe during the system test, without moving the coax cable to another port.

    We have verified in our lab that port 2 does work for CRT mode with 2 VRUs on a LAN. When you move the coax cable to a different port, you must REBOOT the VRU. Please connect to port 2, reboot the VRU and test the CRT mode once more.

- -

12. QUESTION: FEB90 (reports, log record)

    Customer currently has a VRU type box and does data logging to a PC to generate reports. He is going to replace it with a 9270 or 9274 VRUs. He wants to be able to do the data logging function and have the data go to a MVS host instead of the PC. I have read that the log records are in something called CSV format.
    1. I assume he could use the serial port to get a connection to the 3745 , but what would he gen the VRU as?

    2. Could you give me some clue as to what kind of a host application he could use to access these these CSV records in the VRU?

    3. Does the 9274 have some improved features that would make it a better choice for doing this operation (easier) over a 9270?

ANSWER:
The VRU logging is permits the user to identify the data and format to be logged. The log records may be printed via the serial port. This is what is currently supported.

If you want to capture the information in a PC instead of printing it, that would be a customer provided function. Uploading the resulting file to a host would be offline from the VRU operation and another customer provided function.

1). The serial port provides for one-way traffic to a printer, not a duplex conversation with a host.
2). A user-written host application; nothing is provided.
3). The data logging capabilities are the same for the 9270 and 9274.

(NOTE: See section 2.5 in Part 1 of this Technical Bulletin for additional information on the collecting and processing of Log Records.)

An alternative implementation would be to train the VRU to send statistical data to the host at each call completion. Again, the data would be analyzed by a user-written host application.

- -

13. QUESTION: JAN90 (reports, pubs, log record)

Can you please point me to any document listing and describing the various VRU reports. I need to compare them to ACD-type reports.

ANSWER:
The 9270 VRU System Administrator Training and Operations WORKBOOK, SU31-0042-01, and the 9270 VRU System Administrator Training and Operation GUIDE, SU31-0041-01, both contain numerous Index entries under "reports." Also see related Index entries under "log record."
Appendix B of the Workbook provides samples of the VRU reports.

- -

14. QUESTION: JAN90 (reports, statistics)

What Statistics are collected and reported by the 9274 ?

ANSWER:
The VRU statistics reporting is identical to the 9270. Please refer to the 9274 General Information Manual on page 36 and in Appendix B.

From a host perspective, facilities to keep statistics in a manner similar to the 3174 have not been announced with the 9274. However, the host product NPM can be used to monitor traffic going through VTAM on a PU or LU basis (see Chapter 11, Analyzing Session Data, in the NPM Operations publication, SH20-6360). NPM can also report on line utilization, (i.e., the remote link to the communications controller).

- -

15. QUESTION: AUG89 (reports, log record)

    The user uses the automatic print capability to print statistic reports automatically every night at midnight. The user also uses the same printer to print log records for every call received. This causes the log records and statistic reports to be mixed together on one page. What is desired is a form feed before the statistic reports are printed so they may be easily separated from the printout and copied for morning distribution.

    ANSWER:
    With one printer it is not possible. If you had a second printer, you could send log records to one and statistics to the other. This is described in the System Administrator Training and Operations Guide on page 6-4.

    -

16. QUESTION: JAN90 (LOGON)

    My customer is trying to logon to the same appl for all four ports and gets msg userid already logged on...Can't we train the VRU to have four simultaneous sessions or must we create a separate userid for each port? If so , HOW? This could get redundant by the 10th or 11th port...Thanks.

    A: You can create separate LOGONs. It is dependent on the host but it is typical to require separate LOGON id's for each port. You cannot go to four different terminals and logon using the same id. The VRU looks exactly like four terminals to the host.

    -

17. QUESTION: JAN90 (interfaces, OPS, SL)

    I understand there are some differences in transfer capability between the ROLM OPS and ROLM SL interfaces. This also seems to be affected by software release level of the ROLM CBX. Could you please describe the difference and effect of release level? Also, can you tell me where this is documented? Thanks.

    ANSWER:
    The VRU can work with either of these interfaces. From the VRU's perspective, the telephone signalling steps would be the same. If the results for a VRU request differ between these interfaces, it is a telephony and switch environment issue to clarify or select the most appropriate facility. Additional documentation on having a VRU signal a transfer is available in Part 2 of this Technical Bulletin.

    If you do not understand the ROLM OPS or SL interfaces, or the impact of the ROLM switch release level on VRU requests, please enter your question on the ROLM queue and direct comments on ROLM publication to the appropriate organization.

    -

18. QUESTION: JAN90 (host attach, remote, 9274)

It is stated in a VRU Product Overview Guide (from Raleigh Market Support) that the 9274 attaches remotely to the FEP. In the 9270 environment, must the 3174 also be remotely attached to the FEP, or can I attach the 3174 directly to the host?

ANSWER:
The 9270 can attach to a 3174 terminal controller. The 9270 does not care or dictate the terms of the terminal controller link to the host. The 3174 controller could be local or remote or on a token-ring. The 9274, however, is only a remote controller which has VRU capabilities. Remote controllers attach to the FEP.

- -

19. QUESTION: JAN90 (3174 MLT)

My customer is using a 9270 attached to a 3174 with MLT support to talk to multiple host sessions simultaneously. The 9270 switches between sessions using the Alt Insert key and can recognize which session it is on by looking at a portion of the screen status area. Does the 9274 with the built in 3174 function support MLT?

ANSWER:
No, the 9274 does not support multiple logical terminals. Thanks for sharing your success with the 3174 MLT function and the 9270.

- -

20. QUESTION: JAN90 (TT, translate table)

My customer has 2 large translate tables. We now want to do voice training on the translated values. Is there any way we can just transfer the table to the voice section or do we have to RETYPE the whole thing?
Also, regarding a modified screen field by using a translate table, I have the steps:

Move (modified) SF: s warehouse into OF: o warehouse
Modify field s warehouse by:
Translate with rules from translate table: warehouse

I have defined the screen field s warehouse to be 4 characters in length. Sometimes the warehouse is only 3 characters in length (ie WSI stands for the "Mount Vernon Warehouse" in the warehouse table. Will it matter if I type in the translate table "WSI" translates to "Mount Vernon Warehouse," or since the screen fiels s warehouse is 4 characters in length, do I have to put "WSI " (with a blank character) to translate to "Mount Vernon Warehouse." Will a screen field of "WSI " match the translate table "WSI" or do I have to type in "WSI " the translate table for all of the warehouses that appear on the screen with only 3 characters (into a field that is 4 in length).

ANSWER:
For the first part of your question, please refer to page 4-13 of the Training and Operations Guide (SU 31-0041-01) where it states that

Translation Table values are added MANUALLY to the vocabulary list and are not required items.
For the second part of your question, please read the explanation on page 3-103 of SU 31-0041-01 (the Training and Operations Guide).
When translating screen field of variable length, TYPE TRAILING BLANKS after each translation value so that each value fills the entire length of the screen field. If this is not done, then the VRU will apply the default translation rule (see page 3-103).

Also see Chapter 15 in Part 3 of this Technical Bulletin.

- -

21. QUESTION: JAN90 (display, operator field, log record)

It there any way to display the contents of an OPERATOR FIELD or TELEPHONE INPUT FIELDS after a test session? (other than writing speaks in the application training to speak the contents of the field)

ANSWER:
Yes, check out the Log Record capability. Remember to reset Operator Fields at the end of a call.

- -

22. QUESTION: JAN90 (LAN, files, speech)

My customer is considering networking 9274s, and wants to know how long it takes to perform different steps.

1. When you send the voice files from one 9274 to another, how long does it take? Assume 30 minutes of voice.

2. When changes have been made to the speech training, does the entire speech get sent, or just the changes?

3. If I'm sending training to several 9274s, will the training be sent to all at the same time, or serially? (Assuming that I have requested the group)

4. After changes have been made to the speech training, is there a recommended technique to compress the recording on the disk (not compress the PCM, but use the disk efficiently)?

ANSWER:
Networking the 9274 is exactly the same as the 9270. It uses a proprietary format that allows the transmittal of training, voice and system software with up to 50 units connected.

1. I cannot tell you an exact amount of time for transmitting voice training as the time will vary with each application. It is faster than using diskettes and should be less than a couple of minutes.

2. The entire speech.

3. Please see page 1-24 of the Training and Operations Guide.

4. No compression is possible. It is possible to optimize the storage after changes are made (when vocabulary is deleted for example) by storing the voice onto diskettes and re-loading onto the hard disk.

- -

23. QUESTION: JAN90 (reset, operator fields, START)

Are the OPERATOR FIELDS reset or cleared when the application returns to START? We want to do some system housekeeping after the caller hangs up or is transferred, and what is done depends on different values in an OPERATOR FIELD, we want to simply return to START and then do the cleanup routines.

ANSWER:
No, returning to START does not automatically reset the Operator Fields. You need to add a Call Completion process to reset any fields or counters that you are using. The reset steps should also be executed if a caller hangs up in the middle of a call.

- -

24. QUESTION: JAN90 (line state, busy, hours available, 800)

The customer would like callers who call during certain hours to get a busy signal. They want the VRU to busy out all incoming lines based on time of day. Will the following scenario work properly ?
Do a time check before the answer telephone step in Host Up and Host Down...if the time check is valid....go on to answer the phone, if it is not...then (page 3-48 Training & Op Guide) do a SET TELEPHONE LINE STATE ....set to make the line busy. This loop would remain in force (START-HOST UP/HOST DOWN-TIME CHECK-SET TELEPHONE LINE STATE) until the time check proved valid ...fall through to answer the phone...

ANSWER:
Expand on your proposal by answering a couple of questions:
What do you do with the calls that come in and hit busy ?
Do you want to handle the calls as HOST DOWN,
why not re-route the calls in the telephone switch based on time of day (not even route the calls to the VRU), and finally,
Do you want the callers to receive a busy tone or do you just want to disallow access to the VRU application???

QUESTION:
The key to this is that the customer is concerned about his usage based charges for 800 service. If he can limit the availability of his lines to a certain period..maybe 7am-7pm, and return busy tone the rest of the time...he can reduce the charges billed to his 800 lines.

He sees giving a busy to callers during off hours (reducing traffic on the 800 lines) as a good way of controlling these costs.

His whole question depends on us not answering the call during certain times. He is aware that we can do alot even when the host is down, but he doesn't even want to answer the call...that means a connect charge.

Your question about re-routing the calls via the switch is one we are checking on; the customer would like the control for usage on premise if possible.

Your last question, yes we want the callers to receive busy tone, we do not want it to answer (during specified times) because that would incur a connect charge. Thanks for your help.

ANSWER:
You CANNOT give BUSY signals back to an 800 carrier. You need to get the carrier to turn off the trunks at some specified time like before 7 AM or after 7 PM. This is not a VRU issue.

- -

25. QUESTION: JAN90 (9274, closed message, hours available)

Customer will be installing a 9274 and has a question. What is the best way to program the 9274 to branch to a different procedure for an "office closed" condition. As an example; if someone calls after the office is closed, they would like to hear a message telling them that the office is closed and to call back later. Is there a day/date calendar in the VRU that can be set to handle this condition, or an easy way to re-set the VRU for this condition? Thank you.

ANSWER:
The VRU has access to and can make decisions based on the system Date and Time. The availability of the VRU is not a factor of the office being open or closed as its functioning is a factor of the host being up. The VRU can function 24 hours per day. If you would like the application to be available for a limited number of hours, then the application training can be designed to answer all calls after hours with a message such as, "I am sorry but the XYZ application is not available at this time, please call back tomorrow between the hours of ... and ... ."

- -

26. QUESTION: JAN90 (3174 MLT)

My customer has a potential application for a VRU which we are investigating. The application would have people calling in who would need to access information from two different applications on the same phone call. The response time of their host is less than optimal for logging on/off of applications. Is it possible for a single VRU port to be logged onto two sessions simultaneously and to toggle back and forth between them based on the user request? If not, do you have any suggestions? Thank-you.

ANSWER:
The VRU is a CUT mode device. It is supported in an environment with a single LOGON to a host. At least one account, however, has

managed to train the 9270 to work with the 3174 MLT function, (see information in related Question 19 on page A-8).

- -

27. QUESTION: JAN90 (multiple scripts, dial, reboot)

Is there a way to have multiple 'scripts' stored on the VRU such that at a certain time one activates and at another time another script activates? Second, is it possible to dial in to the VRU to change the training? Can you please tell me if there is one place in the documentation that tells when you have to reboot the system and when changes take place without rebooting. I am confused about what happens when you make application changes and how they take effect. Thanks for your help.

ANSWER:
I am interpreting multiple scripts as various messages that are accessed by a single application. I am also assuming that all of the voice recordings have been done for the content of the multiple scripts.

A VRU application can choose a greeting based on the time of day. If the multiple scripts involve a caller listening to the latest interest levels, the updated or latest available information could either be obtained from the host application or perhaps from an updated Operator Screen (see section 1.7 in the Training and Operations Guide, SU31-0041) Operator Screens can be updated at a VRU while the VRU is online. The updated Operator Screen can be distributed to other online VRUs that are connected on the LAN.

A VRU application is created and modified only at the attached console. It is possible to train the VRU to accept updates to information contained in Operator Screens from the system administrator who dials into the system. This type of special update facility needs some type of password protection. See section 12.3 in Chapter 12, Part 3, of this Technical Bulletin.

It is not possible to dial into a VRU to make changes to the logic of the application. It may also be possible to dial into the host application to update records that are then accessed by the VRU.

You are correct in pointing out that information on re-booting should be consolidated in one place. My first attempt at doing this follows:

> If you change the configuration, voice recordings, application steps the system Date or Time, load the systems files, or change the port to which the console is attached, you should re-boot the system prior to going online.

- -

28. QUESTION: DEC89 (recoverable, voice)

On the "SPEECH TRAINING MENU" at the bottom it shows a scale of Used, Available, and RECOVERABLE vocabulary. What does RECOVERABLE

mean and how can I recover that space. It appears to grow each time I delete a phrase or word from the Vocabulary list.

ANSWER:
When words or phrases are deleted at various locations within the VRU recorded voice training, a fragmentation of disk storage occurs.
To recover this space you should:
(1) Backup the voice training onto diskette(s).
(2) Restore the voice training from the diskettes to the fixed disk.

I recommend keeping at least two copies of backup diskettes for each type of file (voice, application, system, etc.).

- -

29. QUESTION: JAN90 (trunk, line, loop start)

What are the trunk specifications for direct trunk termination. My understanding is that they are required to be loop start. Also, what are the pros and cons and more detailed specifications of the trunk types.

ANSWER:
Telephone LINE (not trunk) specifications for connection to the 9270 are the same as a single line, DTMF, 2500 telephone set. This is a loop start interface. There are no provisions for trunk connection to a 9270. This is the same for both the primary and referral line connection.

- -

30. QUESTION: JAN90 (change date, reboot)

We have a VRU application that is day and time sensitive, i.e., it only operates M-F 8am to 5pm. When we change the date or time from the on-line menu to either a Saturday or after 5pm to test its procedures, the VRU does not seem to have recognized the change. If we then REBOOT the VRU and run the same test, the programs day/time recognition works fine. So my question is, must we reboot the VRU for a date/time change to be effective? Is this also true if you change it from the off-line utilities menu?

ANSWER:
Yes, you need to reboot an online VRU for a time date/time change.

- -

31. QUESTION: JAN90 (signal to noise)

What is the signal-to-noise ratio of the 9270/9274 stored speech and how is it measured ?

ANSWER:
Signal to noise ratio is measured with a fixed load (600 or 900 ohms) and is ratio of the background noise, sometimes called Gaussian or white noise, to the usable signal (in this case voice). The 9270 uses a standard Pulse Code Modulation technique of 8000 samples and an 8 bit

word or 64,000 bits per second to encode the analog voice into a digital format to be stored on the hard disk. This is proven technology that has been in use for more than 20 years. There is not a published specification that provides the signal to noise ratio for the VRU.

- -

32. QUESTION: JAN90 (field size, telephone input)

What are the limitation with field sizes used for comparisons, telephone input etc..are there any restrictions?

ANSWER:
Field sizes are determined by the host application, the screen size, and human factors considerations. The greatest limitation on telephone input would be the human factors considerations. By that I mean, how long will a caller continue "pounding the DTMF pad" before getting confused, making a mistake or hanging up. Good Human Factors engineering judgement should be exercised. Eleven or twelve digits of telephone input should not be a problem. Longer input fields could be processed in multiple segments.

- -

33. QUESTION: JAN90 (keyboard, terminal)

I just tried to install a new VRU and couldn't get it to work.
After unpacking the machine, I connected a 3191 display with a 122 key keyboard to the VRU and installed the system code. I then parked the hard disk and repacked the machine. I took it to it's final location, unpacked it and connected a 3191 display with an enhanced keyboard. When the VRU completed it's initial tests, it put the proper message on the 3191 screen. This message says to hit the enter key. If I hit the enter key below the shift key, nothing happens. If I hit the enter key by the numeric keypad, I see the following under the status line: X followed by a stick man with an arrow coming out of each hand. If I turn the display off and back on I get an X, a box with a line through it followed by 2 . What is happening here? is the 3191 not able to talk to the VRU with an enhanced keyboard or what?

ANSWER:
Yes. What sometimes will work is if you unplug and re-plug the coax. The 2 % is an indication of an incompatible terminal and has been mentioned in previous INFO items as well as the Installation and Training Techniques Technical Bulletin on page 2-1.

QUESTION:
What CURRENT display products are supported by the VRU?
I assume that the enhanced keyboard in not compatible with the supported data entry keyboard. Is this true?

ANSWER:
Please refer to page 6 of the General Information Manual for compatible terminals.

- -

34. QUESTION: JAN90 (base screen, START)

Base Screen: I don't understand multiple screens processed under the Base. 1. How is the Base Screen different from other screens? 2. Does the VRU recognize a screen as the Base and treat it differently? 3. Is the processing for the Base Screen the main line code and the other screens the subroutines? 4. Does control go to the code associated with the other screen when received and return to the Base Screen when finished? 5. Are the other screens different in that they do not branch to START while the BASE screen does?
I have developed an application outline for a government customer that is working. It will be polished through testing. I wonder if I should change the application outline so that there are not separate screens and instead have a Base and several subordinate screens that get called from the Base. Is there a preferred way?
I took out the branch to start from some but it does not seem to matter. Is the branch to START necessary?

ANSWER:
You should Receive all screens under the Base Screen. The initial screen list should only go back to START. This means, Send (enter), Receive and go to START. You should change your application to receive all screens under the Base Screen. Please refer to Chapter 1 and 2 of the Workbook where this is explained in detail in the sample, "The Company."

QUESTION:
I have read the manual and of course if it answered all my questions I would not have created this item. It is not clear to me why I should do as you have instructed, .i.e put all the screens under the Base because it is not clear to me what difference it makes. Does the Base Screen application outline give up control to another screen which has its own application outline and when that screen is done does that screen simply not branch to start? Is that how control is returned in-line to the Base Screen application? That point is not clear to me.
I am not clear on how the Base coordinates with the other screens.

ANSWER:
You must Receive all screens under the Base Screen. Screen processing is essential to all applications and the method of training the 9270 is established and tested. If you do not choose to obey the conventions of the product then we have no way to support your application or to fix it when it does not work properly. You will have predictable results and a properly functioning product only if you adhere to the directives that are germane to the application development of a 9270. The initial screen list should be for recovery only, i.e. when the caller disconnects, the VRU then goes to START, finds the screen on which the caller hung up and sends that screen and receives a new screen. This will continue until the VRU gets to the Base Screen and is ready to answer another call.

- -

35. QUESTION: NOV89 (ACD, backup plan)

My customer is planning to install a single 9270 in a Help Desk environment, initially to do call routing of incoming calls to specific application Help Desk specialists. The VRU is part of an ACD group. My customer has two questions:

1) If a large number of incoming calls occur from agents in the field (e.g. a key application is down), how can these calls be handled in such a way that users do not get a busy signal? Can they be directed to a recording? Can they be sent to a "real" overflow Help Desk? What does IBM suggest in this situation?

2) The VRU goes down....what is the backup plan (based on one VRU) that the customer should implement in the event of a VRU going down?

ANSWER:
(1) The 9270 implementation should cover most peak situations. Whatever is not handled by the network of 9270s will either result in a busy signal OR it will roll over to live agents. The idea is to offload calls from the live agents. There are many help desk implementations; make sure that your customer is aware of all of the options.

(2) A single 9270 has no backup if it is down. Between your load concerns in item 1 above and your legitimate backup concerns, it sounds like you will benefit from having multiple VRUs on a LAN.

NOTE: Shouldn't all customers use a VRU in their Help Desk ? Yes.

- -

36. QUESTION: NOV89 (serial printer, cable, printer)

I ordered P/N 8509386 for the VRU to talk to a Proprinter a serial interface. The Sex on one of the ends is wrong! Could you tell me what the proper cable is for the VRU?

ANSWER:
I am not aware of a P/N of a standard cable which will work with the 9270 VRU and a ProPrinter. Page 1-9 in the 9270 Planning, Installation and Maintenance Guide shows the pin wiring required for operation with with the 9270. If your cable matches these requirements, then all you have to do is convert the sex on one end of the cable. Other cable adapters would allow you to correct pin wiring as necessary, or custom build a new cable from scratch. The serial printer cable used with the 9270 is not a standard cable.

- -

37. QUESTION: JAN90 (type ahead)

How can I allow a person to override a prompt with input in one place, but later force them to listen to the prompt before allowing input?

ANSWER:
You can set type ahead globally and then within a speak turn it off forcing a caller to listen to the entire speak before being able to enter additional information.

- -

38. QUESTION: JAN90 (configuration file)

Once converted to release 2.0 the Disk Utility menu no longer displays a selection for copying the configuration file. Is the configuration now stored along with the application training or does one need to recreate the configuration when using the back-up diskettes?

ANSWER:
The Configuration file is still there in Release 2.0 but it was renamed. Please see page 7-14 of the System Administrator Training and Operations Guide. See option 7 and 8 on the Disk Utility menu.

- -

39. QUESTION: JAN90 (AS/400, 5394)

Can a 9270 be attached to an AS/400 via a remote 5394 ? If so, what speeds and modems are recommended ?
Also, will the four ports of 9270 use one twinax to connect to the 5394 or will it take up all four available ports?

ANSWER:
Remote connection has not been tested and is not supported. If you will look at page 3-4 of the PIM Guide and page 6-13 of the Training and Operations Guide, you will find a detailed explanation of the connection of a 9270 in the 5250 world. All four ports of the 9270 are accessed through one twinax connector and in the configuration training (page 6-13) the port number and addresses are specified.

- -

40. QUESTION: DEC89 (AS/400, 5250 kit, twinax)

How does a VRU physically connect to an AS/400? INFO item Q434315 explains that each AS/400 port can handle a combination of seven lines from the 9270s. The submitter of the question is asking about communication ports, but doesn't the VRU connect to twinax workstation controller ports? Also, is the 5250 interconnect kit just a coax to twinax converter? It has 4 lines, yet the AS/400 port can attach 7 lines. Can I attach 7 of the 8 lines from 2 kits to one port, and attach the 8th line with another 4 line kit to another port? Can a kit be split across ports?

ANSWER: * * 5250 Twinax Connectivity for the 9270 VRU: * *
Seven VRUs, each with 4 lines (total of 28 lines) can be attached to a 5250 type controller or S/36 or AS/400 type host. Four ports would be required in this connection, see the 9270 Planning, Installation and Maintenance Guide, SU31-0043. Seven VRUs attach to four twinax ports.

For example, the first port takes 4 lines from the first VRU and three lines from the second VRU. The second port takes the 1 remaining line from the second VRU, four lines from the third VRU and 2 lines from the fourth VRU, etc. The Guide referenced above documents this notion rather clearly.

- -

41. QUESTION: NOV89 (maintenance options, IOE, COE)

Can you please clarify what the various 9270 Maintenance options are: IOE 9876, IOE 9830 and COE 9824 ?

ANSWER:
The IOE and COE options are discussed in the 9270 QBUCKET. Use keywords of 9270 QBUCKET to find the information on INFO/SYS.

A purchased 9270 includes a 12 month warranty, which is the equivalent of the COE maintenance offering. After the first year, the customer has a choice of maintenance offerings, IOE at $2400 and COE at $2100. For an explanation, see Entry04 in the 9270 QBUCKET. Note that the difference between the two service offerings is $300. The IOE #9876 option is an upgrade from the standard (COE #9824 equivalent) warranty option for the first year to the IOE offering.

Correction to Entry04 (01/12/89) in the QBUCKET:

The IOE option includes a commitment by IBM to have a part available at the nearest Parts Station in 4 hours. The CE dispatch time from the Parts Station to the customer depends on the customer location and must be added to the four hours.

- -

42. QUESTION: JAN90 (off-hook, busy port)

Abstract: What happens when your primary line is Off-Hook and you proceed to START ? Does the line status reflect ON-Hook ?

QUESTION:
I am trying to understand what in our application may be causing certain VRU ports to be unavailable for a large portion of the day (according to 9751 ACD stats).
Our application when it is on the "Base" screen, sits at a answer telephone step. Here is where I am concerned.
We answer the telephone, if there is a system error, we have accepted the standard error routine under process exceptions.
The standard routine says set telephone line state (standard method) and proceed to label start.
Under system standards, set telephone lines options are:
Busy out the primary line.
So to net it out, if we encounter a system error after answering the telephone, we busy out the primary line and proceed to start.
The VRU would then determine we are on the Base Screen and wait at the answer telephone step. Since we never put the

primary line back on-hook, how would we ever receive an incoming call (unless that is addressed by the proceed to start).

ANSWER:
In the VRU the answer the telephone step means that the line is idle and the VRU gets ready to receive the next call. If a call is not received within 30 seconds, then the VRU will go back to START and perform the necessary initial screen processing to get back to the BASE and be ready to answer the next call. You need to ascertain exactly where in your application the VRU actually is and whether or not it is at the answer telephone step. The log records can provide a trace of what the VRU is actually doing. By using a log record under every main label, you can find out exactly what is happening.

- -

43. QUESTION: JAN90 (help desk, transfers)

My customer has trained his 9270 VRU with a call routing application for his Help Desk function. The application has been written and is being tested now. Basically, the user calls in on a single extension, and then based upon the type of problem, is transferred to the extension of an application specialist best able to answer the user's question. The application is trained so that the next call transferred to the specialist's desk will speak to the caller with "THE LINE IS BUSY, PLEASE HOLD." However, during testing this works 80% of the time. Sometimes, the second incoming call, instead of getting the busy message, is being presented with the top of the application.

ANSWER:
I think that you will find that you need to adjust some of the timing parameters that are probably set at the 9270 default values. These parameters are customizable such that the 9270 can be used with virtually all brands of telephone switches. The line must be held busy for the switch to be able to know that the VRU is still in use (before it can be made ready to answer another call).

- -

44. QUESTION: JAN90 (0X06000027, error code)

My customer goes through several screens during the logon process then gets error 0X06000027, waiting for operator information area, OIA. What does this error mean and how do we resolve it?

ANSWER:
It sounds like you have an unrecognized or unexpected screen. Please check and let me know. It may also be caused by host timeout.

QUESTION:
I found out that the problem was caused by a host timeout. Where can we get a listing of these error codes?

ANSWER:
There is no such listing (see the following questions).

- -

45. QUESTION: FEB90 (0X0000005E, error code, field exits)

I am interfacing the 9270 with a S/36 running the DMAS application. At the Begin Order screen, I use "enter data on CRT" to input the customer number and the ship to number in succession. Then I follow that with a "send crt data to host" with an enter key. I get

Return Status: 0XFFFFFFFF
Return Error Code: 0X0000005E.

When I look at the error log I see.....

Soft Error Code 0X14000029

I realize that return error code 0X0000005E is the error you get during an if operation when the condition is not met. Why do I get that error when I send an enter key to the host? My cost times out and occasionally, I get a KBD-0018 on my crt which indicates that I have used an invalid key to exit a field. This does not make sense. I use the same logic when I sign the VRU onto the system/36 and that works fine. I am moving a telephone input field into a screen field and the screen field is what I enter on the CRT.

ANSWER:
I am guessing that you have some unexpected or unrecognized screens.

QUESTION:
You are correct that I get a host time out. I prompt the caller for customer number and put that in a telephone input field T CUSTOMER NO. I prompt the caller for ship to number and put that into a field called T SHIP NO. Then I move T CUSTOMER NO TO S CUSTOMER NO and T SHIP NO to S SHIP NO. These fields are output to the screen followed by an enter key. You are correct in that I do get an unexpected screen. My question is why does my screen not change? The system is acting like I never pressed the enter key.

ANSWER:
I think that you have failed to train for some screen. Unrecognized and unexpected screens must be received and included in the application training. Please refer to chapter three of the System Administrator Training and Operations Guide as well as page 5-7 of the Installation and Training Techniques (document GG66-3119). Please also read the FLASH that contains 42 training tips for the VRU, (see Appendix B).

QUESTION:
I did train for unrecognized screens. My problem is that my begin order screen does not change. It is as if the enter key instruction was not received by the host. After I press the enter key, I should receive my order header. It remains on my Begin Order display.

ANSWER:
In any AS/400, System 36/38 there is a need to use Field Exits to move from field to field. This is not a VRU problem but a misconception of how the host works. Please try the following:

FIRST ENTER
1. Enter data on the CRT screen
2. Send data with FLD EXIT
3. Receive the SAME CRT screen
   1. Process the SAME screen
      1. Proceed to 2ND ENTER

2ND ENTER
4. Enter data on the CRT screen
5. Send the CRT with FLD EXIT
6. Receive SAME CRT screen
   1. Process the SAME CRT screen
      1. Proceed to FINAL SEND

FINAL SEND
7. Send CRT with ENTER
8. Receive NEW screen

- -

46. QUESTION: MAR89 (0X0D000010, 0X08000005, 0X0D000009, error code)

We have been experiencing problems with our telephone lines. We received several error messages from the 9270 VRU; one of them was hard error 0X0D000010, "TTV error occurred; no globals."

What does this error code mean?

ANSWER:
This means that the TTV processor (each line is connected to a TTV, or Touch-Tone Voice, board) detected a hard error on the telephone line and there is no current caller active on the line. This may accompany error codes 0X08000005 or 0X0D000009.

- -

47. QUESTION: MAR89 (0X08000016, error code)

While copying an application from one module to another on two networked 9270s, the system continually rebooted. When we checked the error log, we saw the message:"Error 0x08000016, non-application link was encountered; runtime is reinitialized."

Powering off the VRU and recopying the software seems to have resolved the problem. What does this error code mean?

ANSWER:
This occurs when linkage between system tasks or application outline steps fails; in the case of a system task failure, the 9270 reboots. If this code occurs during application outline execution, the application will return to label START.

- -

48. QUESTION: MAR89 (0X0C00000C, error code)

Can you help us understand what soft error 0X0C00000C means? The description says "Error mounting a device and placing the channel ID of the device in the mounted channel array." Is this an error we should care/worry about?

ANSWER:
This is often a result of opening the diskette drive during the copy process. It also can be caused by a defective diskette drive that "drops ready." Removing the System Files diskette from the diskette drive when the 9270 has been booted from diskette may also cause this error code.

- -

49. QUESTION: JAN90 (power failure, UPS)

My customer is concerned about a power failure in the location of his 9270 VRU. First, if the 9270 is connected to a PBX, and the 9270 takes a power hit, what is the status of any incoming calls? Can the 9270 be connected to some power backup system (UPS, Battery, etc.)?

ANSWER:
Yes, the 9270 can be connected to a power source such as a UPS. Without power backup, the VRU cannot handle any calls if it experiences any loss of power. For full functionality, every component would require a UPS, i.e., the host, the controller, the telephone switch and the VRU.

QUESTION:
What happens to the incoming calls currently in process by the 9270? If the 9270 goes down but the CBX/PBX stays up, what is the status of in-process calls being acted upon by the 9270 VRU?

ANSWER:
If power goes down to the VRU, it cannot handle any calls. The CBX can be programmed to forward calls after a specified number of rings such that Ring No Answer calls can be sent to another extension.

- -

50. QUESTION: FEB90 (switch, install VRU)

My customer does not have a ROLM CBX. They would like to know if there are any restrictions/limitations they need to consider before installing a VRU?

ANSWER:
As long as the switch can provide an analog line that utilizes DTMF signalling there should be no problem with connecting a VRU. The use of various switches may dictate selecting different values (other than defaults) when training for call transfers.

- -

51. QUESTION: OCT89 (range validation, telephone input)

The 9270 VRU publications are not very clear on how to perform a range validation on a telephone input field. Can you explain how to check multiple digits to see if they are in the range of 0-4. What must be included in the application training to accommodate telephone input in which a range error will be detected?

ANSWER:
Telephone Input fields are defined in Telephone Input Field Training. Add the name of a telephone input field, such as "T TEST" with an appropriate length and characteristics (numeric).

1). When you Expand "T TEST," you will see four areas:
1 size
2 type
3 format
4 validation

2). After reviewing the first three items, Expand step 4. You will see a list of Steps to choose. To do a range check on numeric input, select Step 8 (Part of input is in a range). Select Step 8 N times, where "N" is the length of the telephone input field. If "T TEST" has a length of 5 characters (or digits), select Step 8 five times. All five appearances of "Part of input is in a range" (Step 8) in the training outline will have an asterisk (*) until the following procedure is performed for each of the Steps.

3). Expand the first occurrence of "Part of input is in a range," responding to the prompts as follows:
subfield size: 1
position: 1 (range check of first position)
minimum value: 0
maximum value: 4

4). Expand the second occurrence of "Part of input is in a range," responding to the prompts as follows:
subfield size: 1
position: 2 (range check of second position, etc.)
minimum value: 0
maximum value: 4

5). Perform similar operations on the last three occurrences of "Part of input is in a range," incrementing the position of the subfield by one (for values of 3, 4, and 5 respectively).

There is nothing else that you have to do in the application training. If you look at the expansion of the RECEIVE TELEPHONE INPUT FIELD step, you will see three areas:
Accept the input
Process exceptions
Reprompt for input

The second area, Process exceptions, already contains what is required to respond to a range validation error. The message under "Invalid input format" will be spoken to the caller along with a "Reprompt for input."

In the "Standard Exception Listing" section of an application training printout, you will find the "Invalid input format" message. Optionally, you could change this message from:

"The information entered needs to be in a specified format,"

to: "The information entered needs to be in a specified format or numeric range."

Note: If you have a problem performing a range check on the final position, temporarily define the telephone input field to be one extra character in length. When prompted as to whether you should keep the existing validation steps, respond YES. Then Expand the step for the range validation as described above. Finally, you may redefine the telephone input field back to its desired size, keeping the validation steps.

- -

52. QUESTION: FEB90 (additional Enter, SNA controller)

During SYSTEM TEST using real system screens, there are a number of times we have had to code an additional ENTER key to go to the next screen. The additional ENTER is NOT required when the same transactions are performed on another CRT (not connected to the 9270).

ANSWER:
This in not a 9270 fault. Past experience has shown that this condition was the result of the host sending an online message which looked like a new screen to the 9270. The 9270 was receiving two screens. The host online message (such as VM's RUNNNING) was transparent to users but not to the VRU. A person familiar with the host system should be involved to help ascertain exactly what is being sent. The possible coding could look like the following:
Receive CRT screen A
1. Process expected screen A (the desired screen, expand this and do the caller transactions)
2. Process expected screen B (the online message)
    1. Send CRT screen to host (Clear key or the equivalent)
    2. Receive CRT screen A
        1. Process expected screen A
            1. Proceed to a label under screen A

QUESTION:
We have begun to test the VRU application with the 9270 ONLINE. BIG problems with the extra ENTER keys coded. The situation looks something like this:

```
VRU                                   HOST

(Sitting on screen "A")

Send CRT screen to host: ENTER  --------->     Begin IMS transaction
(keyboard locks)
                                      Complete trans
VRU receives first "segment" of  <----------- Send response
response (keyboard unlocks!)

Receive screen "B"
  Process screen "B"
  Process screen "A"
    Send screen/ Receive "B"
  Process unexpected/unrecogn
```

* * * * * * * * * * * * * * * * * * * *

As soon as the VRU receives a piece of the IMS response, he begins to process screen "A" again because he has not received screen "B." Therefore, the 9270 sends ANOTHER enter key, and IMS responses with an error msg "DFS574 Unexpected data received --- Input ignored."

So...we took out all of the extra ENTER key programming and watched what happened. Just what we expected - the VRU was a on screen "A," sent the ENTER key, began to receive the response, immediately went into Receive screen "B" and got an error - unexpected screen received "A."

Then, to slow down the VRU, we put a PAUSE in the flow.

```
Send CRT screen to host.
Pause (5 seconds)
Receive screen "B"
```

And it Worked!!

However, this seems like a terrible way to skin a rat! We currently have the VRU hooked to a 3274-41D on a CUT port. Does the fact that the controller is a NON-SNA device make a difference???

QUESTION:
We moved the 9270 to a SNA controller - and the sun shone thru!! No more additional ENTER keys required. The application is working on the 9270 just like it would on a any other CRT....

ANSWER:
I appreciate your comments as it is good information for everyone.

- -

53. QUESTION: JAN90 (invalid data, ACD, multiple phrases)

I know that much of what you can do with the 9270 is actually driven by the CICS transactions that it works with on the host, but can you tell me if the following functions would be possible and which component would actually provide the function?

1) User calls in to place an order through the 9270. The VRU tells them to enter the color code, which can be one of 125 number codes. If they enter an invalid code, we would like them to receive an error message and requested to re-enter the correct color code. Is this a function of the CICS transaction?

2) The customer has a switch with the ACD function on it...can I assume that the 9270 will work with that function the same as it will work with the ROLM ACD function?

3) The customer's help desk is staffed by 16 people. These people will still be responsible for taking calls that the 9270 cannot handle. If a 9270 only has 4 referral lines, does that mean that they have to have 4 9270's to be able to route calls to all 16 at a time? Once the call is transferred to a human call taker, does it drop the referral line on the 9270, or is it busy until the call is complete?

4) We want the VRU to give an alternate phone number to some callers. Is there a way to code a pause between area code and the phone number, instead of just saying 9132951495 all in one electronic breath? Again, is this a 9270 or CICS function?

ANSWER:
1. A 9270 is functionally the same as a terminal. A telephone caller inputs DTMF tones and the 9270 converts those signals into a data stream that can be sent to a host. The host acts on that input and sends a screen back to the 9270 which can then read and speak information back to the caller in digitally stored human voice.

2. If the telephone switch can provide analog (DTMF) lines to the 9270, then there should be no problem in connecting to the ACD. It is not possible to know if the ACD of one vendor is the same as another. Each could have multiple different implementations across their respective product lines.

3. If it is desired for all incoming calls to be handled by a 9270 and there are currently 16 agents, it could require up to four VRU's (four ports per). The call holding time for a 9270 can be considerably less than a live agent so that more calls can be handled with less lines attached. Sixteen agents may be replaced with only twelve VRU ports. Each application can give different results which makes it impossible to be certain exactly how the resulting traffic will flow. It is safe to assume that 16 VRU ports can handle as much or more incoming traffic as 16 live agents. If the telephone switch does not support call transfer by use of hook switch flash, then it is necessary to use the referral port on the VRU to transfer a call. If a call is transferred via the referral port, then the VRU acts as a bridge and both the incoming line and the referral port will remain busy and unavailable for the duration of that call.

4. The way in which information is spoken by the VRU is determined by the application training and particularly the Speak a Message portion of that training. What the Speaks will sound like depends on who the

person(s) is that does the recording. You can use multiple phrases within a Speak a Message for the area code, exchange and the final four telephone digits. You can insert a comma into a phrase to get a pause of 2 seconds. More than one comma may be used for longer pauses.

- -

54. QUESTION: JAN90 (telephone input, alphabetic, numeric)

I read item regarding how to input (from the DTMF keypad) alpha and numeric characters. The response said that the 9270 must be told what kind of input to expect from the caller after each prompt by the user during application customization. This seems fine if the input will always be fixed, for example, letter letter number number for each entry. However, in my customers case, the entry into the keypad will be a variable input of letters and numbers. How would they tell the VRU to expect an alpha character versus a numeric? If the input is always a fixed format I can understand how a "2 2" would mean the character "B" if the 9270 is programmed to expect a character but if the 9270 won't know if the input is to be a number or character, a "2 2" input might be interpreted as a number 22 instead of the letter B.

ANSWER:
Please see page B-3 in the Training and Operations Guide. For alphanumeric entries, you precede each input with an *. This is the bottom left key on a DTMF pad. For example: * 2 2 is used for the alphabetic "B." The asterisk shifts the mode from a default of numeric to alphabetic. An input of: 2 2 is two numeric digits.

- -

55. QUESTION: JAN90 (host application)

How do you handle calls received when the application is not available but the host is up?

Our Application logs onto a session manager, enters an IMS transaction and ANSWERS THE PHONE. If IMS is "crashed" or it is after 5:30PM we can't get to ANSWER THE PHONE in HOST UP processing because we have to have IMS available.

My customer would like the VRU to ANSWER THE PHONE and SPEAK A MESSAGE "This application is not available now. Please call later." We make the DECISION about AFTER HOURS during the logon process and proceed to HOST DOWN to ANSWER THE PHONE and SPEAK the above message. Is this correct? Will the VRU stay in HOST DOWN and ANSWER THE PHONE? We were told to only have two ANSWER THE PHONEs, once in HOST UP and once in HOST DOWN.

ANSWER:
If your host or host application is down from 17:30 at night until 07:30 in the morning, the best method is to code the incoming lines on your telephone switch for "night answer" which will send all of those calls to a recorded announcement. This can be done by specific time

of day and precludes any need for complex manipulations of the VRU training or on the host application. For times when the host is down due to unpredicted trouble, it is a simple matter to train the VRU for HOST DOWN processing.

- -

56. QUESTION: JAN90 (parameters, system administrator, failure)

1) Are there any system parameters that cannot be changed on-site by the System Administration , such as prompt announcements ? Are there any things that can't be changed while the system is on-line?

2) Does the system administrator need a terminal? A printer? else?

3) In order to produce the reports, what equipment is necessary (ex.: printer?)

4) What will happen to incoming calls and calls-in-progress if
a) the VRU itself goes down due to reasons OTHER THAN a power failure?
b)the CBX goes down for reasons OTHER than a power failure?

5) Does the system provide malfunction alarms? Can this alarm indicator be placed remote from the VRU, at the attendant's location? If the VRU is connected to trunks in front of the CBX, can it detect a bad trunk? If it is connected to analog trunks behind the CBX, can it detect a bad line?

6) If the VRU needs to later be expanded, how is that done? Would any existing hardware need to be replaced?

ANSWER:
1a. No, an on-site system administrator has access to the VRU.

1b. Yes, any application training changes or vocabulary changes must be done with the system off line. An exception to this is making updates to Operator Screens and distributing them; this can be done while the VRUs are on-line (see section 1.7 in the Guide). This feature could be used to facilitate prompt announcements.

2. The system administrator needs a terminal and a printer is optional.

3. A printer is preferable but the report information is output to a RS-232 port which could be sent to a PC (this is a user task).

4. If the VRU fails, it depends on whether there are several VRU's or only one. If there is one, then the calls can be re-routed to other extensions. If there is more than one VRU installed, then the functioning VRU handles the calls. If the telephone switch goes down, then there will be no incoming calls unless provision has been made for alternate incoming telephone lines from the LEC (Local Exchange Carrier).

5. There are LED indicators on both the front and back of the VRU. No provision is made for remote management information although it

is possible to monitor all VRU's in a network from one terminal and all reports can be sent to a single printer. A VRU has no ability to connect to a trunk nor provide any trunk status information as it only connects to a line. If a line goes down or is out of service, it is the function of the telephone switch to ascertain that and not a function of the VRU.

6. If additional capacity is needed after installation, VRU's can be added in increments of four ports. Additional telephone lines must also be added as well as the necessary ports on the controller(s). No existing hardware should need to be replaced as the VRU is designed to grow "gracefully."

- -

57. QUESTION: JAN90 (repeat message, transfer, aux. hardware)

1) Can the VRU give a caller the option of having information repeated, or transferring to a 'live' person?
2) Does the VRU transfer the call to an attendant whenever the caller does not respond to a prompt?
3) Are there any auxiliary pieces of hardware/software that need to be ordered besides the VRU itself (such as a modem)?
4) Can outside callers place themselves on hold if they need to take time to get a piece of info (like a zip code) that the VRU is asking them to type in?
5) Is there a limit on:
   * the number of main menu selections
   * the length of each prompt?
6) What default options, if any, are set up in the software, and what are the default procedures?(for example, if the caller were to dial an invalid extension number, or if the caller were to provide an invalid response to a prompt).

ANSWER:
1. Yes
2. Yes, if the application training is so designed. It could also be possible to hang up or transfer to another extension.
3. The documentation is ordered separately. An optional printer is also recommended. A microphone and speaker could optionally be purchased.
4. Yes, as long as the VRU was trained to allow some amount of idle time between inputs. Usually, a VRU is trained to time out after a period of time if nothing is input.
5. The number of main selections is usually a factor of how many options do you think a caller will listen to before hanging up (human factors engineering). Same comment for length of each prompt, although phrases are limited to 8 seconds unless several are strung together.
6. Default options are many and are delineated in the manuals. The way that invalid caller input is handled is determined by the application training. The VRU system administrator determines how the system should handle invalid input and designs the application accordingly.

- -

58. QUESTION: JAN90 (5250, twinax, terminal address)

We can't seem to get 5250 connection working with multiple VRU's on the same twinax line. Here is the current configuration. We have two VRU's and would like to configure six modules. They are defined on the S/38 as devices 0 through 5 on port 3. I believe we have the physical connection correct - there is twinax going from the first module on the first VRU to the second module of second VRU. This second module has a U-connector and is attached to the controller on the S/38. We are unsure of the configuration training however. In the training on the first VRU, we filled in a '1' for address 0 through 3 on port 3. On the second VRU, we filled in a '1' for address 4 and 5 on port 3. We are not using networking. When we attached the terminal to module 4 of the first VRU we are able to log on to the S/38. When we attach the terminal to module four of the second VRU it does not work. We also tried attaching the terminal to the second module - this does not work either. Do we need to change the address of the terminal? When we switch the terminal back to the first VRU, we must go into configuration training again and resave the configuration before it will work on the first VRU.

ANSWER:
1. No matter which VRU the terminal is connected to, the terminal address should be set to 0.

2. Make sure that the controller switches are set as shown on page 3-7 of the Installation Guide.

3. The host must be set for a 3196 with a typewriter keyboard.

4. 1's in addresses 0-3 or port 3 sounds OK but try 2's for addresses 4 and 5 on that same port 3 (do this on both VRU's). You should not have to re-save the configuration each time you move a terminal from one VRU to another. Make sure that when you move a terminal to the next VRU that you attach it (the terminal) to one of the two ports being used.

- -

59. QUESTION: OCT89 (AS/400, dial out)

Will this application work? The user has a VRU attached to an AS/400. Callers call in, enter the number that they are calling from. This is sent to the AS/400. The AS/400 sends the VRU a phone from its file based on the caller's input (calling dials this outside number and connects the caller). Upon completion of the call, both the primary and referral lines are freed for the next call. My concern is not the feasibility of this application on the VRU, but the VRU's capacity to handle one such transaction for each incoming call. In reading through other questions, a common message keeps coming up. That message is that the VRU is not intended for heavy outbound calling. It seems like a great application to me! Thanks

ANSWER:
The 9270 is capable of reading a field from a host screen and then dialing a number from that field. There are several things that

are a concern after the number is dialed: disconnecting the 9270 at the proper time, training the 9270 to recognize various signalling tones and then taking appropriate action based on those tones and being able to recover from a ring no answer. The point that I want to emphasize is that the 9270 is designed to answer calls, not be an outdialing predictive dialer.

QUESTION:
Can the 9270 do the things that you are concerned about?

In a normal call, the called party answers, talks, disconnects. The lines should become free.

In the case of busies (either network or dialed number), will the 9270 recognize these tones, then disconnect? Is it programmable?

In the case of the ring no answer, will the 9270 recognize this, then disconnect?

ANSWER:
I do not believe that there is such a thing as a, "normal call." The 9270 can recognize both fast and slow busy. The 9270 recognizes a disconnect when it senses dial tone or current interrupt. Ringing tone is a call progress tone that does not signify a disconnect rather an unanswered call. The 9270 has no ability to perceive Answer Supervision and thus cannot ascertain when a call has been completed or not. By the same token, it cannot know if it reaches an answering machine or a live party. This is a serious limitation in doing any kind of outdialing. The main point is still that the application that you describe is stretching the design intent of the 9270.

- -

60. QUESTION: SEP89 (hang up, LOGOFF, CICS)

If a caller hangs up, can the 9270 recognize that condition and issue a LOGOFF to CICS ?

ANSWER:
The VRU recognizes a hang up by two methods. One is detection of a dial tone being returned on the line and the other would be from an interruption of current on the line. Assuming that you want the VRU to continue to answer incoming calls, there is no need to LOGOFF from the host CICS application. The VRU application handles multiple calls sequentially while remaining Logged on to the host application.

- -

61. QUESTION: OCT89 (math operations)

What is the magnitude of mathematical operations that may be done with operator fields in the 9270? I know it is possible to add data to a field (to make it a modified operator field).

But, I have a bank that would like to investigate, at some point, the capability of allowing their callers to call in, input a loan amount, and tell the caller what the expected monthly payment is...they may be able to go to a host screen and get the interest rate, and they would ask the customer for the term of the loan.

Then, is it possible to calculate the monthly payment based on these things? Thanks.

ANSWER:
Calculating monthly payments is an amortization function that has a complex mathematical formula. An annuity figured from a present amount uses the formula: i(1 + i)** n - 1 / (1 + i)** n - 1 where i is equal to the interest rate in decimal format, n is equal to the number of time periods and ** means raised to that power (n). In typical spread sheet programs this formula is imbedded in the software. The VRU has no such complex capability but could be linked to a host program that could do amortization and then speak the loan payment. Please see pages 3-30 through 3-34 of the SAT and Operations Guide for a detailed explanation of moving data into a field and modifying it. The VRU does not by itself have the ability to do loan amortizations.

- -

62. QUESTION: SEP89 (ATI, OPS, interfaces, wink-off)

I have heard that there may be some performance problems when using the ATI card with the 9270 VRU. The areas of concern seem to be with Wink on/off and slow response. Is this true and if so, what is the recommended interface to connect the VRU to a 9751 switch? Can you also provide a list of the pros and cons of the various interface options that are available.

ANSWER:
The recommended interface to the VRU is the OPS. The OPS provides the VRU with a wink-off which would cut approximately 6 seconds off the transaction time. (Without the wink-off it could take up to 6 additional seconds for the switch to recognize the disconnect, recognize the VRU in an off hook state, provide dialtone to the VRU, and for the VRU to recognize the presence of dialtone and hang up.)

INFO item #Q429806 provides a list of CBX releases where the wink-off capability and flash capability and not mutually exclusive. (The 9751 CBX can provide wink-off and flash capability simultaneously.)

- -

63. QUESTION: OCT89 (LAN, console, Operator Screen)

I have a user who is planning to install multiple VRU's in a LAN and are planning to use the Operator Screen facility to update some information in a real-time manner. They would like to be able to have several people have the ability to update an Operator Screen and then distribute it across the VRU LAN. Is there a limit to the number of VRU consoles that can access a unit (LAN) as the

console? If I can have multiple consoles, what kind of management problems might I incur if I'm not careful? Thanks,

ANSWER:
Please refer to the System Administrator Training and Operations Guide, page 1-34 where a description of Update Operator Screens is written. In a LAN, one console is used. More than one has not been tested and is not recommended. When supplying screen updates, both the transmitting and receiving modules may be on line when the updated operator screen is copied via the network.

- -

64. QUESTION: AUG89 (telephone input, size)

User has telephone input field which will be filled with either 8 or 10 digits depending on the subsidiary the caller belongs to. The application only uses the last 8 digits. We have been unable through messages to get the callers to only enter the last 8 digits. Want to allow the caller to enter all digits and then move the last eight into a screen field. Cannot get this to work. Defined T field with 10 digits right justified, filled with zeros. Used field validation with min. of 8 digits, max of 10 digits. In process exceptions section used disregard option for timeout waiting for total input. When testing VRU will not work unless 10 digits are entered? Any suggestions? Moved data into a modified T field, should I have used an operator field?

ANSWER:
Here is a suggestion. Receive telephone input, make a decision which is based on whether or not it is an eight or ten digit input, if it is an eight digit input then LEFT justify it and put it in a screen field, if it is a ten digit input then strip the first two digits and put it in a screen field (again LEFT justified).

If the screen field parameters are left justified with no character fill then the two most right hand digits of the ten digit telephone input field will be stripped. If it is desired that the left most digits be stripped then the screen field should be right justified with no character fill.

- -

65. QUESTION: AUG89 (call answer, port available)

When we first call into the VRU, our call is answered on the first ring. After we hang up and immediately call back, our call which is sent to the same port is not answered until after 4 rings. I know that after the first call hangs up, the VRU spends some time resetting counters and returning to the Base Screen, however, I thought that while it is doing so, it busies itself out. If it does busy itself out, I would expect that the second call would not get through until we were back at the Base Screen at the answer the telephone step. If this is true, I would then expect it to answer on the first ring like it did on the first call. So that takes me to my initial question, how and when does a switch know

that a VRU telephone port is available? Should we be trying in our application outline to busy out the line? Thank you.

ANSWER:
You should not "try to busy out" anything in the application training. You are correct that it takes some amount of time to get ready for the next call (processing time in the VRU) after a call has been handled. What you did not mention is how the call that was handled was terminated. For example, if there is an option in your training to "press 0 to end this call" and users choose to do so, then the recovery process will be much faster than if the caller just hangs up. Please add to your question and I will expand my response.

Is your VRU attached to an ACD? If so the caller should never receive a busy and instead will receive a ring. This will also explain why you sometimes get varying numbers of rings before an answer.

QUESTION:
Our VRU is not attached to an ACD. It is attached to a simple centrex hunt group. The first call was ended by the caller hanging up, not by a caller keypad entry.

ANSWER:
When a caller hangs up, the VRU cannot immediately recover as it has to wait for current interrupt or dial tone to ascertain that the call has been ended. In the interim, if another call comes in, the Hunt Group will select the next available line or if the initial line has become available it will be selected (rung). This is not a defect of either the VRU or the phone system, but the way that both are designed to function.

QUESTION:
That makes sense, however I still have two questions. I was under the impression that once the VRU detected a telephone disconnect, it would set the telephone line state to busy and go through its recovery procedures. Is this true? Are you now telling me that it is possible that during the time delay between a caller hanging up and the VRU detecting the disconnect, that it is possible for a second call to be delivered to that same VRU telephone port, such that the VRU goes through its recovery procedure while the second call continues to ring (i.e. it never detects the disconnect and so it never sets the line state to busy for recovery)?

ANSWER:
No, and no. The VRU does set the line state to busy while it is in the recovery state (actually the busy state is in the telephone switch and is caused by the state of the line, busy, idle or ringing). The ringing tone that you are hearing when you make a second call is coming from the telephone switch. I can only speculate on what the reaction of the hunt group is when it tries the first line and it is busy. It may ring the next line in the group immediately or it may take one ring cycle to "hunt" to the next available line (by which time the initial VRU line may be idle). The VRU cannot even begin the recovery process until it has

"discovered" that the call has been dropped which is determined by the telephone switch returning dial tone or by current interruption on the line. Once this has been detected, the line will remain busy until the VRU has completed the return to idle state and made the port ready to receive another incoming call. Does this answer your concern??

I would add that the VRU does not "set the line to busy" as the line is already busy if a call has been answered. In other words, once a call comes in and is answered, the port remains in a busy state (unable to receive another call) until that call is finished and the VRU has gone through its recovery process. The state of all the lines attached to the VRU is monitored and controlled by the attached telephone switch. As long as the VRU is processing a call and until it returns a line to idle state that line will remain off hook (which is seen as busy by the respective telephone switch).

- -

66. QUESTION: AUG89 (Base Screen, Initial Screens)

The Installation and Training Techniques manual states, "Once the Base Screen has received control, the application should never 'Proceed to a Label' in another initial screen except under exceptional conditions." (p. 5-4)
What are the restrictions for doing this and why?
Can multiple initial screens share the same speech message?
Or, when the same message needs to be spoken, must it be duplicated in the 'speak a message, compose a message' step, for each initial screen? By the way, the customer asked why we use the term, "initial screen." I assume it is because each initial screen is the beginning of a process defined for that particular part of the application. Is that correct?

ANSWER:
Steps and screen fields are screen specific. If you proceed to a label on a different screen, the system will think that it is still on the screen that it came from and will not be able to access the fields of either the screen that it is actually on or the screen that the label is on. For speak a message and compose a message you must enter each individually even if it is the same message that appears elsewhere. The term initial screen is used because each initial screen is the start of that part of the application (just as you speculated).

- -

67. QUESTION: AUG89 (sizing VRU, call hold time)

The Washington Systems Center Flash 8850.7 describes the factors to be considered in properly sizing the VRU. Among the elements involved in calculating total 9270 VRU traffic is the VRU Call Hold Time which includes VRU Work Time. Are there any recommended guidelines for estimating the work time

or the time it takes the VRU to get back to the home screen after completing a transaction?

ANSWER:
In determining numbers of ports in a 9270 environment, the call holding time will be the most important factor. The amount of time required to return to home screen will be a small fraction of time that will depend on the response time of the host as well as the the 9270 processing time. Each application will behave uniquely but for capacity planning purposes, the holding time of the calls will be sufficient to do accurate traffic engineering. Since the 9270 is installed in four port increments, the planning process should show when the environment is near the threshold of exceeding the limit of the unit and grow to the next box of four ports. After installation, it will be necessary to monitor the 9270 to ascertain if more ports are needed as the traffic is measured in a "live" arena. Please add to your question if needed.

QUESTION:
I am confused by your answer -- are you saying that using the VRU Call Hold Time WITHOUT accounting for the VRU Work Time should be initially sufficient for traffic engineering?

ANSWER:
No, I am saying that the VRU work time is a small fraction of the call hold time. The VRU work time is a difficult entity to quantify as it is dependent on the host processing/response time. The main thing to remember is that you are not ever able to come up with figures that will exactly reflect reality but you should easily come up with an estimate that will get you within four ports (one VRU). Another factor that is virtually impossible to quantify is called demand stimulation. An example might be a brokerage house where a VRU is installed and stockholders can call in to check their accounts. Stockholders who would call a live agent once a month may now call call several times a day to check the price of their holdings. In other words, automation has caused the call volume (traffic) to escalate dramatically.

- -

68. QUESTION: AUG89 (clock speed, Motorola 68000)

Is the internal clock speed for the 9270 VRU equal to or greater than a standard 80286 based processor ?

ANSWER:
The 9270 main processor is a Motorola 68000. Each of the interface boards also has a Motorola 68000 processor. This is a 32 bit micro processor which is in an 80386 class of machine. The clock speed is not published.

- -

69. QUESTION: MAY89 (menus, multiple phone numbers)

Is it possible for the 9270 to present different prompts to the lines attached to the same 9270 when it first responds to the call? The customer would like to reduce the number of menus their customers have to go through to get to the desired application.

ANSWER:
Assuming that you use one published directory number which is preferred, then let the attached telephone switch route the calls to an available port, it is impossible to give differing greetings. As for the number of menus that a user has to access, the VRU has the option of allowing a caller to "walk" over or speed up the call by entering codes while a particular message is being spoken. This enables the more experienced user (caller) to key in appropriate codes to get to the point in the application desired without listening to each spoken message. This is analogous to Phonemail where upon entering a mailbox the caller can enter "1" and bypass the greeting to leave a message immediately. In other words, the experienced user does not have to listen to the spoken menus, but can enter codes immediately after being answered.

QUESTION:
In this case, the customer is considering using 2 different phone numbers. One for port 1 and 2, and the other for port 3 and 4. This is based on their individual user departmental requirements and preferences. Does this change anything in presenting different prompts for different lines/ports?

ANSWER:
The VRU can have only one application but based on which line is answering the call, the VRU can proceed to a label (must be on the same screen) that would speak and answer that call uniquely. The steps could look like the following (Base Screen):

1. Answer the telephone
2. Speak a message (optional)
3. Move system field LINE NUMBER into an operator field
4. Make a decision -- if operator field = 1 proceed to XXXX
5. Make a decision -- if operator field = 2 proceed to XXXX
6. Make a decision -- if operator field = 3 proceed to ZZZZ
7. Make a decision -- if operator field = 4 proceed to ZZZZ

In this manner, the application would provide the appearance of being two separate applications to callers dialing different access numbers. To the caller dialing the number for port 1 or 2, the greeting in Spanish would seem like a different application compared to the caller dialing the number for port 3 or 4, who would hear a French greeting. So, while the caller may reach what seem like different applications in a single VRU, there is only one application running and only one application which can be saved, backed up and restored.

- -

70. QUESTION: MAY89 (full duplex)

Is full duplex interaction supported on the 9270 VRU ?

ANSWER:
The telephone connection via an analog DTMF line is full duplex just as a regular telephone conversation is full duplex. The 3174 to host connection is half duplex.

- -

71. QUESTION: APR89 (UL listing, ringer equivalency)

I have not been able to find the following info. in the Announcement Letter, Salesmanual, GU10-3000 GI Manual, or SU31-0041 Training and Operations Guide.

1. Is the 9270 UL registered, and what is the UL listing number?

2. Has the 9270 been certified to meet all applicable FCC regulations, including Part 15 and Part 68 of the FCC Rules/Regulations? If so, what are the appropriate registration numbers? Thanks.

ANSWER:
1. UL listing number 49T8UL.

2. FCC number is AY 389P 17964 MA E.
REN ringer equivalency number is 1.8B.
Canadian number is 3492 163

- -

72. QUESTION: MAR89 (CICS, unsolicited screen)

In the CICS logon session, there is a user friendly screen that periodically flashes to the terminal when CICS comes up slowly. This messages reads "Please wait." We have a very difficult time defining this screen to the training because it comes up and goes away in a matter of seconds. We cannot capture it to define it in the training.

ANSWER:
Unsolicited screens from the host are difficult to process with the 9270 because the 9270 depends on the execution of a "Receive Expected CRT Screen" step to identify the next screen that it receives from the host. If you can not predict when this message will get written to the screen, you will have a hard time telling the 9270 how to receive it.

You can still define this screen by using the Screen Training option of modifying a previously saved screen and defining it as a new screen. If you do this, you will be able to recognize the screen with "Please Wait" (if the 9270 actually receives it), and the 9270 can process it appropriately.

- -

73. QUESTION: MAR89 (unrecognized, unexpected)

We are still getting errors 102 and 103, screen errors, in our application training. Even though we tested the application training and found that ALL the screens ARE recognized, but still manage to get these errors. The concern is that we cannot erase these 9270 generated messages from our application training, even after we tested, saved and exit from the program.

ANSWER:
You can not erase these messages because your application is receiving screens from the host that it does not recognize. What you should do is to select option 11 on the Application Training Menu (Unrecognized/Unexpected Screen Training) and look at the screens that are saved. They are saved under the names, "UNREC1," "UNREC2," and so on. The option exists to transfer these screens to Screen and Screen Field Training so you can give them names and process them under an Initial Screen or under your Base Screen. When you do this with all the possible screens that the 9270 can receive from the host, you will no longer get the 102 and 103 Screen Error Messages.

- -

74. QUESTION: MAR89 (disconnect, hang up)

We are having a problem with callers who seem at first to connect to the VRU but wind up disconnected. When we check the summary report, we find an unexpectedly high number under the column module disconnect. The column caller disconnect is very clear, however we would like to know what events get included in the column module disconnect. Do you think this is including those callers who seem to be mysteriously getting disconnected?

ANSWER:
The module disconnect column means that the 9270 had to initiate disconnection of the line; I have seen this most often when users call in and hang up in the middle of a call. I suspect that the disconnect problems you are having are associated with problems in your telephone system rather than in the 9270. Make sure that the hunt group that is distributing the calls to the 9270 is operating correctly.

Problems like this can also be caused by errors in the training logic. Make sure that your application is not trying to answer or disconnect the telephone multiple times and that you are not setting the telephone line state unnecessarily.

- -

75. QUESTION: MAY89 (screen processing, branching)

I have a non-working application which I am modifying (to get to work!) I use 2 screens to process a call. Both are captured and defined correctly (apparently). In application training, I make a decision (while a screen field does NOT exist) and the screen field shows up on the wrong screen over in screen & screen field training. How do I correct this?

ANSWER:
You must do all processing of a screen under a "Process Expected CRT Screen" step. This is the way that the 9270 identifies the screen that is being processed and associates the Screen Fields with the proper screen. Branching (Proceed to a label) to different areas of the outline will generate a warning message, and will cause unpredictable results. Hopefully, the example below will illustrate the method of processing multiple screens under the Base Screen:

2. HOST UP
   1. Initial screen is BASE
      1. Answer Telephone
      2. Speak a message
      3. Enter data on CRT screen (to get to "SCREEN 2")
      4. Send CRT screen to host
      5. Receive expected CRT screen "SCREEN 2"
         1. Speak a message
         2. Receive telephone input
         3. ..... whatever other processing is necessary of "SCREEN 2"
         4. Enter data on CRT screen (to get to "SCREEN 3")
         5. Send CRT screen to host
         6. Receive CRT Screen "SCREEN 3"
            1. etc.
            2. etc.

- -

76. QUESTION: MAY89 (columns, operator field, translate table)

On one of my screens, the 9270 has to scan down a column of numbers looking for all non-zero values. There are 2 to 5 blank lines between values. When a non-zero value is found, a value in that row in a different column must be saved in an operator field for later use. A third column in the same row must be read and used in a translation table where the value is translated to text which is spoken. How do I train this scenario?

ANSWER:
Let's say your screen looks like this, and you call it "SCRN1" in your 9270 Training:

SCRN FLD A	SCRN FLD B	SCRN FLD C
AAAAAAAA	BBBBBBBB	CCCCCCCC
AAAAAAAA	BBBBBBBB	CCCCCCCC
AAAAAAAA	BBBBBBBB	CCCCCCCC
AAAAAAAA	BBBBBBBB	CCCCCCCC
AAAAAAAA	BBBBBBBB	CCCCCCCC

LAST LINE OF SCREEN INDICATING END

What you need to do to process the screen the way you describe is to use the "repeating field" processing capability of the 9270. Repeating fields are defined in Screen Field Training as the "Previous Occurrence" or "Next Occurrence" of a screen field.

To be able to define the next occurrence of a field in Screen Training, the next occurrence of a field must be referenced in a "Make a Decision" or "Speak a Message" step in the application training. Once you do this, an asterisk will appear next to the referenced screen field definition in Screen Field Training, and when the field is expanded, you will be able to choose the "First Occurrence" or "Next Occurrence" of the field and can define its characteristics.

An important consideration in defining a repeating field is that it should NOT be used for anything else than determining whether the field exists on the screen in the "Make a Decision." If any compares or manipulation of the field are done, they should be done on a "shadow" field that is defined to exist as a singly-occurring field that exists in the same position as the repeating field. I hope the example below makes this a little clearer:

Using the Screen at the beginning of this item, do the following:

1. Use a "Make a Decision" to determine whether "SCRN FLD A" exists (or doesn't exist, depending on your logic). This will activate the repeating field processing of the 9270. When you go to Screen Field Training, screen "SCRN1" will have asterisk next to it, and if you expand "SCRN1," "SCRN FLD A," it will also be marked with an asterisk.

2. Under Screen Field Training, Expand screen "SCRN1" to "SCRN FLD A." You will notice that there are now two choices - defining the FIRST occurrence, or the NEXT occurrence. In your case, the NEXT occurrence of "SCRN FLD A" should be defined as a field that occurs 1 line below the first occurrence and that can be blank. (Note: making it possible for the field to be blank will disable the "Automatic Paging" capability of the 9270 - more on this later.)

   The number of occurrences of the field on the screen is also defined here.

3. Repeating fields can not be used in any other capacity than being tested to see whether they exist or don't exist. The "Make a Decision" that performs this test positions the 9270 at the next occurrence of the field each time it is executed; any other logical or mathematic operations must be done on a "shadow field" that is defined as related to the repeating field, occurring once in the same position as the repeating field. This field could be called "SCRN FLD A1."

3. Fields "SCRN FLD B" and "SCRN FLD C" are also defined as related to the repeating field, occurring once and positioned relative to "SCRN FLD 1"

In operation, each time the "Make a Decision" testing the existence of "SCRN FLD 1" is executed, the 9270 will move down 1 row, and compares or manipulation of the related fields can be done. Each time the repeating field is incremented, you get a new set of related fields. Because the automatic paging capability is disabled since the possibility of blank entries exists in your application, you must keep track of your position on the screen and enter the appropriate command to go to the next page when (or if) required and also detect the last screen when it is reached.

- -

77. QUESTION: APR89 (RNA, busy line)

According to the planning, etc. guide p 3-10, to test the telephone lines and listen for a busy signal. I am getting ring no answer. I was advised to go into the telephone standards configuration and change the default from ring no answer (RNA) to busy. I did this and still get RNA. The user wants busy so that the ACD software will try another line if the VRU application is not available. How do I change this to get the busy function working?

ANSWER:
Please refer to the Planning, Installation and Maintenance Guide, page 5-3 and 5-4. On page 5-4 please note the section labelled telephone lines. A simple test of the line to make sure that it is working can be done by connecting a single line set (analog). You can then test to see if the telephone line is getting to the VRU and if you leave it off-hook, whether or not, a busy signal is returned.

- -

78. QUESTION: APR89 (translation table)

I have created a translation table to convert branch office numbers to a spoken name. How then do I tell the application training to refer to this particular translation table. Is there some sort of correspondence between the field name and the table name?

ANSWER:
This procedure is documented in the manuals. The procedure is as follows:

1. Move data into an operator field
2. Expand source of data
3. Choose modified field
4. Expand Modified field
5. Option 16 is translate
6. Expand translate step
7. Supply name of translation

QUESTION:
Would you please tell me where this answer is documented in the publications? I can only find a casual reference in the Workbook.

ANSWER:
See section 3.7 in chapter 3 of the System Administrator Training and Operations GUIDE (SU31-0041) and see Chapter 15 in Part 3 of this Technical Bulletin.

- -

Appendix B. 9270 Training Guidelines

WSC Flash 8927 Dated: 7/89

The Guidelines that follow are a collection of suggestions and warnings that have come about as the result of experience and problem solving. They have been written with efficiency and error prevention in mind. They represent a good way to train the application but certainly not the only way.

NOTE: If you have discovered similar 9270 training tips which you would like to share, please submit them as a blind response to 9270 INFO item Q443515. As additional 9270 training tips become available, additional Flashes will be published.

1. All host screens used in the outline should be in the initial screen list. This is where the VRU searches to identify which screen it is on, after determining that the host is up. It then searches the list from top to bottom. If the VRU does not find the current screen in the initial screen list, it will take the unexpected screen path. This path is the final entry in the list. Please refer to Figure 6-1 on page 6-1 of GG66-3119, VRU Installation and Training Techniques.

2. The BASE screen should be the first screen in the initial screen list. This is usually the one most often used in normal processing. It is the one that the VRU must be residing on in order to answer the phone under host up condition. Please refer to Figure 5-4 on page 5-6 of GG66-3119.

3. Do not use a BLANK screen as your BASE screen unless it is absolutely necessary. The VRU cannot tell if it is logged on or not when it is on a Blank screen and will answer the phone before it makes this determination. If it is not logged on the first Send CRT screen to host will result in an error message and the call will be sent down the unexpected screen path.

4. All application training that involves a caller should be done under the BASE screen, and screens within the BASE screen path.

5. The RECOVERY screens (all host screens except the initial screens) should be directly beneath the BASE screen in the initial screen list. Each screen should be trained to get back to the BASE screen or interim screens that must be passed through in order to get to the BASE screen. After the screen is received, you Proceed to the label START where the system will determine if the host is up. At least one of these screens is normally processed at the termination of each call. Please read paragraph 5.3 on page 5-5 of GG66-3119.

6. The LOG ON screens should be directly beneath the RECOVERY screens in the initial screen list. Each one should be trained to get to the next screen in the log on sequence. Proceed to the label START when the screen is received. These should be the least used screens, thus their

location at the bottom of the list.

7. The unexpected/unrecognized screen is the last screen in the initial list. After checking the entire list of screens, top to bottom, the system will conclude by default, that it does not know what to do with the screen that it is on and will follow the steps trained under this path.

8. The first steps under the unexpected/unrecognized screen should be instructions on how to recover and get to a screen that is on the initial screen list (usually press the CLEAR key and receive the Blank screen). If it was an unrecognized screen that can occur again in normal day to day processing it should be added to the list, along with the steps necessary to process it.

9. The application listing is easier to read if capital letters are used for all labels.

10. Place all commonly used labels that are used to terminate a call under the unexpected/unrecognized screen in the initial screen list, (i.e. ERROR W CALL, TRANSFER, AFTER HOURS, GOOD-BYE etc).

11. Always go to ERROR W CALL after receiving an unexpected screen, unrecognized screen or host time out if there is a caller on the line. Please read paragraph 5.6.1 on page 5-8 of GG66-3119.

12. Never go to START or HOST DOWN with a caller on the line because the call will be dropped with no explanation.

13. Always proceed to START after receiving an expected screen in the RECOVERY or LOG ON screens. There is no caller on the line at these times.

14. Always proceed to HOST DOWN after receiving an unexpected screen, unrecognized screen or host time out when there is no caller on the line. This is during the recovery and log on sequences.

15. Never proceed to a label that is on a different screen. Steps and screen fields are screen specific. If you proceed to a label on a different screen, the system will think that it is still on the screen that it came from and will not be able to access the fields of either the screen that it is actually on or the screen that the label is on. An exception to this rule is that you can proceed to a label on the unexpected/unrecognized screen, specifically the ERROR W CALL, TRANSFER or AFTER HOURS.

16. Remember to return to the previous system screen (using the RESET key) after reading an operator screen so that the system will be able to access the fields and labels of the actual host screen on which it is residing.

17. Answer the phone only Twice in your application. Once under HOST UP and once under HOST DOWN. If you come to an answer the telephone step while you have a caller on the line, the caller will be disconnected when the system executes the step.

18. Place steps outside (before) the Answer the Phone step Very Carefully.

These steps will be performed repeatedly while waiting for a call. Putting the wrong steps here can cause a number of problems; excess logging of records, invalid statistics, jumping over necessary steps and excessive errors in the application error log.

19. Do not make Widows. Always follow a Send CRT screen to the host with a Receive CRT screen step. The following three steps may be used:

    Send CRT screen to the host
    Speak a message (Standby while we search the host)
    Receive the CRT screen

20. Do not make Orphans. Do not leave steps that have no label abandoned beneath the Receive CRT screen steps. They will never be performed because they can never be reached.

21. Remember to put a Receive telephone input step after a speak where input has been requested from the caller.

22. Remember to change the Accept input option under the Receive telephone input step to, Yes terminator is Required (#9), if you are receiving a variable length field.

23. If you are using field validation on a telephone input field, be sure to adjust the validation if changes are made regarding the input (i.e. input is a member of a list).

24. Experienced callers appreciate the ability to save time and shorten the call duration through the type ahead capability. If you are allowing type ahead capability, remember that: if the caller enters an extra digit into a fixed length field, that digit will fall automatically into the next input field that is requested.

25. Remember to re-initialize counters at the start of each call. Also be sure to do this outside of the loop in which the counter is being used. All operator field values are maintained until reinitialized in application training or until the system is powered down.

26. Use test speaks to verify the contents of operator fields after they have been modified. Remember to remove the test speaks after the desired results are achieved.

27. Do not mix And's and Or's in a single Make a decision step.

28. Be sure to make the size of a field to be translated as long as the longest possible translated value.

29. When using translation tables, remember to add (type) your translated values that are to be spoken into the vocabulary list. They are not put there automatically.

30. When making comparisons in Make a decision steps, based on length, you must express the length in physical digits. For example for a length of four you must have four characters, i.e. 9999, 4444, 1111, 1234. If you use the number 4 alone the condition will be true if the field is 1 char-

acter long. It does not matter what digits are used to represent the length.

31. After defining a field as a repeating field in a Make a decision, if screen field exists, be aware that it is now a Base field and cannot be used for any other purpose. It cannot be used in another make a decision, speak, calculation, manipulation or translation. You must create a separate field defined as being related to the Base field that occupies the same physical position, i.e. no vertical or horizontal movement.

32. A screen field that appears as a percent and is to be spoken as such must be defined as two separate fields. For example, 10.755% must be defined as 10 = S RATE1 and 755 = S RATE2. It must be spoken as, "S RATE1 point S RATE2 percent."

33. In order to add to or subtract from a time field you must do the calculation using seconds, 1 min = 60 sec, 5 min = 600 sec, 15 min = 900 sec. In doing time calculations they must be in seconds and if constant times are added to a value, they are not TIME constants, they are NUMERIC constants.
34. Do not change standards regarding telephone timing options unless you have a particular need to do so. If you must change them to solve a problem, do so one at a time and test the result before changing others. If the timer you changed does not achieve the desired result, change it back to the standard.

35. All 9270 field names and screen labels are case sensitive. It is a good practice to use the Caps Lock function so that these entries are entered in upper case. It is especially important to note that some terminals have a switch that can make all displayed characters appear as capitals when the entries are actually in lower case.

36. When installing multiple 9270's in a network it is imperative that each unit be named uniquely. These names are also case sensitive. In order for network communication to transpire the target 9270 must be either at the Main Menu or the On-Line Menu. If a target 9270 is in any other condition the message will be that the particular unit is not responding.

37. When installing two units in a network, both switches on the interface cards are in the "up" position as there is no middle unit. Please refer to the Planning, Installation, and Maintenance Guide Figure 4-A and 4-B.

38. When using SAVE and CONTINUE the new training is held in memory but is not written to the hard disk. When using SAVE and SUSPEND the new training replaces the training on the hard disk.

39. 5.25 inch diskettes must always be of the High Capacity type, part number 6109660 or the equivalent (for the 9270 model 01).

40. When training is completed, it is recommended that it be saved on floppy diskettes as backup. This includes all application training and all vocabulary files. As changes or updates are made to these files, they should again be saved for backup. Two copies of the backup diskettes are recommended.

41. A printer is optional for the operation of the 9270. In the application training process, it is a critical component as the printer provides the capability to print all of the accumulated training and therefore makes it simpler to edit.

42. A telephone input field cannot be right or left justified. If a variable length input is possible, then a terminating character (#) must be used. The data in a screen field can be right or left justified.

Appendix C. 9270 VRU PBX Connection Considerations

The table below lists considerations involved in the connection of various types of PBX's to the VRU:

TYPE OF SWITCH	VRU INTERFACE REQUIREMENT (IF ANY)
AT&T DIMENSION PBX SYSTEM 75,85,400,500, and 2000	No known special requirements
COLLINS ROCKWELL GALAXY 3	No known special requirements
COLLINS ROCKWELL GALAXY 3	ACD with ARU Software - telephone system doesn't send recognizable disconnect on hook-flash call transfer. Must train system to time out if no disconnect received.
DATAPOINT INFOSWITCH ACD	No known special requirements
FOCUS PBX	No known special requirements
FOCUS 2 PBX	Sends busy signal for disconnect tone.
GTE-OMNI II	No known special requirements
MITEL ACD	Disconnect sends power drop signal, not power loss.
NORTHERN TELCOM SL-1 and SL-100	Telephone system does not send recognizable disconnect signal. Must train system to time out if no disconnect received. Hook flash must be on hook at least 450 milliseconds.
ROLM	Sends dial-tone for disconnect signal. To transfer call, must dial *7, then dial extension.
ROLM OPX	Off-premise extensions provide loop current, so dial tone not required for disconnect signal.

TYPE OF SWITCH	VRU INTERFACE REQUIREMENT (IF ANY)
ROLM REDWOOD	Works with OPS interface, and possibly with new ATI card. Call transfer does not require *7 leading digits.
TELCOM ECD 2000	Requires at least a 2 second pause after the hook-flash.
CENTRAL OFFICE LINES & CENTREX	Call to order hook-flash and line-hunt services.
DID INTERFACE	Not supported without special external equipment.

Note: All Canadian installations use a CA-11 Jack. The U.S. FCC requires an RJ-18 modular jack be used when attaching any device directly to the telephone network that can make a telephone line busy.

In U.S. installations, if you plan to use the system with a PBX or ACD, a RJ-II (two-wire) jack is sufficient.

Appendix D. Sample VRU Menus

IBM VRU Menu Hierarchy

MAIN MENU

- On-Line Menu (Ch. 1)
  - Reporting Menu (pg. 1-11)
  - VRU Network Utility (pg. 1-26)
- Normal CRT Operation (Ch. 2)
- Application Training Menu (Ch. 3)
  - Application Training Outline (pg. 3-7)
    - Exception Processing Training Outline (pg. 3-55)
    - Application Error Logging Options Menu (pg. 3-124)
    - Save Training Menu (pg. 3-128)
    - Print Training Menu (pg. 3-132)
- Speech Training Menu (Ch. 4)
- System Test (Ch. 5)
- Configuration Menu (Ch. 6)
  - VRU Network Configuration Menu (pg. 6-2)
  - Terminal Configuration Menu (pg. 6-8)
- Utilities Menu (Ch. 7)
  - Disk Utility Menu (pg. 7-4)
  - Display Reporting Menu (pg. 7-24)
  - VRU Network Utility (pg. 7-25)
  - Password Utility Menu (pg. 7-26)

Note: Documentation references are to the VRU Training and Operations Guide, SU31-0041. (The page numbers listed here refer to the "-01" version of this publication.

MAIN MENU
IBM Release 1 Level 01

1. Put Module On-line
2. Normal CRT Operation
3. Application Training
4. Speech Training
5. System Test
6. Configuration Training
7. Utilities

Enter Selection ___

ON-LINE MENU
IBM Release 1 Level 01

1. Watch Screens During Active Operation
2. Shut Down Operation
3. Display and Set Date and Time
4. Change the Current Console
5. Display Reporting Menu
6. Display Network Utility Menu
7. Update Operator Screen

Enter Selection ___

APPLICATION TRAINING MENU

1. Application Outline Training
2. Exception Processing Outline Training
3. Screen and Screen Field Training
4. Telephone Input Field Training
5. Operator Field Training
6. Log Record Training
7. Translation Table Training
8. VRU Application Standards Training
9. Save Training
10. Print Training
11. Unrecognized/Unexpected Screen Training
12. Perform Application Training Integrity Checks

R. Return to Main Menu

Enter Selection ___
Last Changed: date/time

SPEECH TRAINING MENU

1. Edit Vocabulary List
2. Record Voice Vocabulary
3. Change Voice Vocabulary
4. Verify Voice Vocabulary
5. Purge Voice Vocabulary
6. Accept Completed Voice Vocabulary
7. Select Recording/Listening Device

R. Return to Main Menu

Enter Selection ___

DISK UTILITIES MENU

1. Backup Training to Diskette
2. Copy Training to Hard Disk
3. Backup System Files to Diskette
4. Copy System Files to Hard Disk
5. Backup Voice Recording to Diskette
6. Copy Voice Recording to Hard Disk
7. Backup Configuration Training to Diskette
8. Copy Configuration Training to Hard Disk
9. Format the Diskette
10. Format the Hard Disk
11. Display Error Log
12. Backup Error Log to Diskette
13. Display/Change Module Serial Number
14. Backup Disk Configuration to Diskette

R. Return to Utilities Menu

Enter Selection ___

UTILITIES MENU

1. Display and Set Date and Time
2. Display Disk Utilities Menu
3. Display Reporting Menu
4. Display Network Utility Menu
5. Display Password Utility Menu
6. Change the Current Console
7. Prepare Module for Moving

R. Return to Main Menu

Enter Selection ___

REPORTING MENU

1. Print a Statistics Detail Report
2. Print a Statistics Summary Report
3. Print a Statistics Procedure Report
4. Print a Statistics Transaction Report
5. Print a Hardware Configuration Report
6. Print a VRU Network Status Report
7. Clear VRU Printer Buffer

R. Return to Utilities Menu

Enter Selection ___

PASSWORD UTILITY MENU

Current Password Timer - 2 minute(s)

1. Change Password
2. Change Password Timer

R. Return to Utility Menu

Enter Selection ___

NETWORK UTILITY MENU

1. Distribute Training and Voice Recording Files
2. Distribute Training, Voice Recording, and System Files
3. Distribute Training Files
4. Distribute Voice Recording Files
5. Distribute System Files
6. Distribute Terminal and Telephone Configuration Files
7. Shut Down VRU(s)
8. Put VRU(s) On-Line
9. Reboot VRU(s)
10. Perform a VRU Network Roll Call
11. Reapply VRU Network Configuration

R. Return to Utilities Menu

Enter Selection ___

CONFIGURATION MENU

1. Display VRU Network Configuration Menu
2. Display Terminal Configuration Menu
3. Configure Telephone Lines

R. Return to Main Menu

Enter Selection ___

Appendix E. Erlang B Table

ERLANG B CARRIED TRAFFIC CAPACITY TABLES

# SRVRS	Blockage Levels 10.00%	5.00%	2.00%	1.00%	0.50%	0.10%	# SRVRS
1	0.10	0.05	0.02	0.01	0.01	0.00	1
2	0.54	0.36	0.22	0.15	0.10	0.05	2
3	1.14	0.85	0.59	0.45	0.35	0.19	3
4	1.84	1.45	1.07	0.86	0.70	0.44	4
5	2.59	2.11	1.62	1.35	1.13	0.76	5
6	3.38	2.81	2.23	1.89	1.61	1.14	6
7	4.20	3.55	2.88	2.48	2.15	1.58	7
8	5.04	4.32	3.55	3.10	2.72	2.05	8
9	5.89	5.10	4.26	3.74	3.32	2.55	9
10	6.76	5.91	4.98	4.42	3.94	3.09	10
11	7.64	6.72	5.72	5.11	4.59	3.65	11
12	8.53	7.55	6.48	5.82	5.25	4.23	12
13	9.42	8.39	7.25	6.54	5.93	4.83	13
14	10.33	9.24	8.04	7.28	6.63	5.44	14
15	11.24	10.10	8.83	8.03	7.34	6.07	15
16	12.15	10.97	9.63	8.79	8.06	6.71	16
17	13.07	11.84	10.44	9.56	8.79	7.37	17
18	13.99	12.72	11.26	10.33	9.53	8.04	18
19	14.92	13.60	12.09	11.12	10.28	8.72	19
20	15.86	14.49	12.92	11.91	11.04	9.40	20
21	16.79	15.38	13.76	12.71	11.80	10.10	21
22	17.72	16.28	14.60	13.51	12.57	10.80	22
23	18.66	17.18	15.45	14.32	13.35	11.51	23
24	19.61	18.08	16.30	15.14	14.13	12.23	24
25	20.55	18.99	17.15	15.96	14.92	12.96	25
26	21.50	19.90	18.02	16.79	15.72	13.69	26
27	22.45	20.81	18.88	17.62	16.52	14.42	27
28	23.40	21.72	19.75	18.45	17.32	15.17	28
29	24.35	22.64	20.62	19.29	18.13	15.91	29
30	25.30	23.56	21.49	20.13	18.94	16.67	30
31	26.26	24.48	22.37	20.98	19.75	17.42	31
32	27.21	25.41	23.25	21.83	20.57	18.19	32
33	28.17	26.33	24.13	22.68	21.40	18.95	33
34	29.13	27.26	25.02	23.54	22.22	19.72	34
35	30.09	28.19	25.91	24.39	23.05	20.50	35
36	31.05	29.12	26.80	25.25	23.89	21.27	36
37	32.02	30.06	27.69	26.12	24.72	22.06	37
38	32.98	30.99	28.58	26.98	25.56	22.84	38
39	33.94	31.93	29.48	27.85	26.40	23.63	39
40	34.91	32.86	30.38	28.72	27.24	24.42	40
41	35.88	33.80	31.28	29.59	28.09	25.21	41
42	36.84	34.74	32.18	30.46	28.94	26.01	42
43	37.81	35.68	33.08	31.34	29.79	26.81	43
44	38.78	36.63	33.99	32.22	30.64	27.61	44

ERLANG B CARRIED TRAFFIC CAPACITY TABLES

# SRVRS	Blockage Levels 10.00%	5.00%	2.00%	1.00%	0.50%	0.10%	# SRVRS
45	39.75	37.57	34.89	33.10	31.50	28.42	45
46	40.72	38.52	35.80	33.98	32.35	29.23	46
47	41.69	39.46	36.71	34.86	33.21	30.04	47
48	42.66	40.41	37.62	35.75	34.08	30.85	48
49	43.63	41.36	38.54	36.63	34.94	31.66	49
50	44.61	42.31	39.45	37.52	35.80	32.48	50
51	45.58	43.26	40.36	38.41	36.67	33.30	51
52	46.55	44.21	41.28	39.30	37.54	34.12	52
53	47.53	45.16	42.20	40.20	38.41	34.94	53
54	48.50	46.11	43.12	41.09	39.28	35.77	54
55	49.48	47.06	44.04	41.99	40.15	36.59	55
56	50.45	48.02	44.96	42.88	41.02	37.42	56
57	51.43	48.97	45.88	43.78	41.90	38.25	57
58	52.41	49.93	46.81	44.68	42.78	39.08	58
59	53.38	50.88	47.73	45.58	43.65	39.92	59
60	54.36	51.84	48.65	46.48	44.53	40.75	60
61	55.34	52.80	49.58	47.38	45.41	41.59	61
62	56.32	53.75	50.51	48.29	46.30	42.43	62
63	57.30	54.71	51.43	49.19	47.18	43.27	63
64	58.28	55.67	52.36	50.09	48.06	44.11	64
65	59.26	56.63	53.29	51.00	48.95	44.95	65
66	60.24	57.59	54.22	51.91	49.84	45.80	66
67	61.22	58.55	55.15	52.82	50.72	46.64	67
68	62.20	59.51	56.08	53.73	51.61	47.49	68
69	63.18	60.48	57.01	54.64	52.50	48.34	69
70	64.16	61.44	57.95	55.55	53.39	49.19	70
71	65.14	62.40	58.88	56.46	54.29	50.04	71
72	66.12	63.36	59.82	57.37	55.18	50.89	72
73	67.10	64.33	60.75	58.29	56.07	51.75	73
74	68.08	65.29	61.69	59.20	56.97	52.60	74
75	69.07	66.26	62.62	60.12	57.86	53.46	75
76	70.05	67.22	63.56	61.04	58.76	54.31	76
77	71.03	68.18	64.50	61.95	59.66	55.17	77
78	72.02	69.15	65.44	62.87	60.56	56.03	78
79	73.00	70.11	66.38	63.79	61.45	56.89	79
80	73.98	71.08	67.31	64.71	62.35	57.75	80
81	74.97	72.05	68.25	65.63	63.26	58.61	81
82	75.95	73.01	69.20	66.55	64.16	59.48	82
83	76.94	73.98	70.14	67.47	65.06	60.34	83
84	77.92	74.95	71.08	68.39	65.96	61.21	84
85	78.91	75.92	72.02	69.31	66.87	62.07	85
86	79.89	76.88	72.96	70.24	67.77	62.94	86
87	80.88	77.85	73.91	71.16	68.68	63.81	87
88	81.86	78.82	74.85	72.09	69.58	64.68	88
89	82.85	79.79	75.80	73.01	70.49	65.55	89
90	83.83	80.76	76.74	73.94	71.40	66.42	90
91	84.82	81.73	77.69	74.86	72.30	67.29	91
92	85.79	82.70	78.63	75.79	73.21	68.16	92
93	86.78	83.67	79.58	76.72	74.12	69.03	93
94	87.77	84.64	80.52	77.65	75.03	69.91	94
95	88.75	85.62	81.47	78.57	75.94	70.78	95

ERLANG B CARRIED TRAFFIC CAPACITY TABLES

# SRVRS	Blockage Levels 10.00%	5.00%	2.00%	1.00%	0.50%	0.10%	# SRVRS
96	89.74	86.59	82.42	79.50	76.85	71.66	96
97	90.73	87.56	83.37	80.43	77.77	72.53	97
98	91.72	88.53	84.31	81.36	78.68	73.41	98
99	92.70	89.50	85.26	82.29	79.59	74.29	99
100	93.69	90.48	86.21	83.23	80.50	75.17	100
101	94.68	91.45	87.16	84.16	81.42	76.05	101
102	95.67	92.42	88.11	85.09	82.33	76.93	102
103	96.66	93.40	89.06	86.02	83.25	77.81	103
104	97.65	94.37	90.01	86.96	84.16	78.69	104
105	98.63	95.34	90.96	87.89	85.08	79.57	105
106	99.62	96.32	91.91	88.82	86.00	80.45	106
107	100.61	97.29	92.87	89.76	86.91	81.34	107
108	101.60	98.27	93.82	90.69	87.83	82.22	108
109	102.59	99.24	94.77	91.63	88.75	83.10	109
110	103.58	100.22	95.72	92.56	89.67	83.99	110
111	104.57	101.19	96.68	93.50	90.59	84.88	111
112	105.56	102.17	97.63	94.43	91.51	85.76	112
113	106.55	103.14	98.58	95.37	92.43	86.65	113
114	107.54	104.12	99.54	96.31	93.35	87.54	114
115	108.53	105.10	100.49	97.24	94.27	88.42	115
116	109.52	106.07	101.45	98.18	95.19	89.31	116
117	110.50	107.05	102.40	99.12	96.11	90.20	117
118	111.50	108.03	103.36	100.06	97.04	91.09	118
119	112.47	109.00	104.32	101.00	97.96	91.98	119
120	113.47	109.98	105.28	101.94	98.88	92.87	120
121	114.46	110.96	106.23	102.87	99.81	93.76	121
122	115.45	111.93	107.19	103.81	100.73	94.66	122
123	116.44	112.91	108.14	104.75	101.66	95.55	123
124	117.43	113.89	109.10	105.70	102.58	96.44	124
125	118.42	114.87	110.05	106.64	103.51	97.33	125
126	119.41	115.85	111.01	107.58	104.43	98.23	126
127	120.40	116.82	111.97	108.52	105.36	99.12	127
128	121.39	117.80	112.93	109.46	106.29	100.02	128
129	122.38	118.78	113.89	110.40	107.21	100.91	129
130	123.38	119.76	114.85	111.35	108.14	101.81	130
131	124.37	120.74	115.80	112.29	109.07	102.71	131
132	125.36	121.72	116.76	113.23	110.00	103.60	132
133	126.35	122.70	117.72	114.18	110.92	104.50	133
134	127.34	123.68	118.68	115.12	111.85	105.40	134
135	128.33	124.66	119.64	116.06	112.78	106.30	135
136	129.32	125.64	120.60	117.01	113.71	107.19	136
137	130.31	126.62	121.57	117.95	114.64	108.09	137
138	131.30	127.60	122.53	118.90	115.57	108.99	138
139	132.29	128.58	123.49	119.84	116.50	109.89	139
140	133.28	129.56	124.45	120.79	117.43	110.79	140
141	134.27	130.54	125.41	121.74	118.36	111.69	141
142	135.26	131.52	126.37	122.68	119.30	112.60	142
143	136.25	132.50	127.34	123.63	120.23	113.50	143
144	137.24	133.48	128.30	124.57	121.16	114.40	144
145	138.24	134.46	129.25	125.52	122.09	115.30	145
146	139.23	135.44	130.22	126.47	123.02	116.21	146

ERLANG B CARRIED TRAFFIC CAPACITY TABLES

	Blockage Levels					
# SRVRS	10.00%	5.00%	2.00%	1.00%	0.50%	0.10%
147	140.22	136.42	131.18	127.42	123.96	117.11
148	141.21	137.40	132.14	128.36	124.89	118.01
149	142.20	138.39	133.10	129.31	125.82	118.92
150	143.19	139.37	134.07	130.26	126.76	119.82
151	144.20	140.35	135.03	131.21	127.69	120.73
152	145.19	141.33	135.99	132.16	128.63	121.63
153	146.19	142.31	136.96	133.11	129.56	122.54
154	147.18	143.30	137.92	134.06	130.50	123.44
155	148.17	144.28	138.88	135.00	131.43	124.35
156	149.16	145.26	139.85	135.95	132.37	125.26
157	150.16	146.24	140.81	136.90	133.31	126.16
158	151.15	147.22	141.78	137.85	134.24	127.07
159	152.14	148.21	142.74	138.80	135.18	127.98
160	153.14	149.19	143.71	139.76	136.12	128.89
161	154.13	150.17	144.67	140.71	137.05	129.79
162	155.12	151.16	145.64	141.66	137.99	130.70
163	156.11	152.14	146.60	142.61	138.93	131.61
164	157.11	153.12	147.57	143.55	139.87	132.52
165	158.10	154.11	148.53	144.51	140.80	133.43
166	159.09	155.09	149.50	145.46	141.74	134.34
167	160.09	156.07	150.47	146.41	142.68	135.25
168	161.08	157.06	151.43	147.36	143.62	136.16
169	162.07	158.04	152.40	148.32	144.56	137.07
170	163.07	159.02	153.37	149.27	145.50	137.98
171	164.06	160.01	154.33	150.22	146.44	138.90
172	165.05	160.99	155.30	151.18	147.38	139.81
173	166.05	161.98	156.27	152.13	148.32	140.72
174	167.04	162.96	157.23	153.08	149.26	141.63
175	168.03	163.94	158.20	154.04	150.20	142.55
176	169.03	164.93	159.17	154.99	151.14	143.46
177	170.02	165.91	160.14	155.95	152.08	144.37
178	171.02	166.90	161.10	156.90	153.02	145.29
179	172.01	167.88	162.07	157.86	153.96	146.20
180	173.00	168.87	163.04	158.81	154.90	147.11
181	174.00	169.85	164.01	159.77	155.84	148.03
182	174.99	170.84	164.98	160.72	156.78	148.94
183	175.98	171.82	165.94	161.68	157.73	149.86
184	176.98	172.81	166.91	162.63	158.67	150.78
185	177.97	173.79	167.88	163.59	159.61	151.69
186	178.97	174.78	168.85	164.54	160.55	152.61
187	179.96	175.76	169.82	165.50	161.50	153.52
188	180.95	176.75	170.79	166.45	162.44	154.44
189	181.95	177.73	171.76	167.41	163.38	155.36
190	182.94	178.72	172.73	168.37	164.33	156.27
191	183.94	179.70	173.70	169.32	165.27	157.19
192	184.93	180.69	174.67	170.28	166.21	158.11
193	185.93	181.67	175.64	171.24	167.16	159.03
194	186.92	182.66	176.61	172.20	168.10	159.94
195	187.91	183.65	177.58	173.16	169.05	160.86
196	188.91	184.63	178.55	174.11	169.99	161.78
197	189.90	185.62	179.52	175.07	170.94	162.70

ERLANG B CARRIED TRAFFIC CAPACITY TABLES

# SRVRS	Blockage Levels 10.00%	5.00%	2.00%	1.00%	0.50%	0.10%	# SRVRS
198	190.90	186.60	180.49	176.03	171.88	163.62	198
199	191.89	187.59	181.46	176.98	172.83	164.54	199
200	192.89	188.58	182.43	177.94	173.77	165.46	200

Index

F

G

H

I

K

L

M

N

O

P

Q

R

Reader's Comments

IBM 9270/9274 Voice Response Unit Installation and Training Techniques

Publication No. GG66-3119-01

Use this form to tell us what you think about this manual. If you have found errors in it, or if you want to express your opinion about it (such as organization, subject matter, appearance) or make suggestions for improvement, this is the form to use.

To request additional publications, or to ask questions or make comments about the functions of IBM products or systems, you should talk to your IBM representative or to your IBM authorized remarketer. This form is provided for comments about the information and the way it is presented.

When you send information to IBM, you grant IBM a nonexclusive right to use or distribute the information in any way it believes appropriate without incurring any obligation to you.

Be sure to print your name and address below if you would like a reply.

Name _____ Address _____

Company or Organization _____ _____

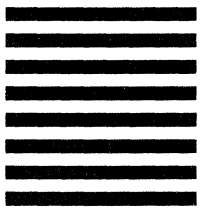
Phone No. _____ _____

Reader's Comments
GG66-3119-01

Cut
Alon

Fold and Tape | **Please do not staple** | Fold and Tape

NO POSTAGE
NECESSARY
IF MAILED IN THE
UNITED STATES



BUSINESS REPLY MAIL

FIRST CLASS MAIL PERMIT NO. 40 ARMONK, NEW YORK

POSTAGE WILL BE PAID BY ADDRESSEE

Jere Rutt
International Business Machines Corporation
800 N. Frederick Avenue
Washington Systems Center
Gaithersburg, MD 20879-3395

Fold and Tape | **Please do not staple** | Fold and Tape

C
A

Reader's Comments

IBM 9270/9274 Voice Response Unit Installation and Training Techniques

Publication No. GG66-3119-01

Use this form to tell us what you think about this manual. If you have found errors in it, or if you want to express your opinion about it (such as organization, subject matter, appearance) or make suggestions for improvement, this is the form to use.

To request additional publications, or to ask questions or make comments about the functions of IBM products or systems, you should talk to your IBM representative or to your IBM authorized remarketer. This form is provided for comments about the information and the way it is presented.

When you send information to IBM, you grant IBM a nonexclusive right to use or distribute the information in any way it believes appropriate without incurring any obligation to you.

Be sure to print your name and address below if you would like a reply.

Name

Address

Company or Organization

Phone No.

IBM®

Cut
Alor

Fold and Tape **Please do not staple** Fold and Tape

NO POSTAGE
NECESSARY
IF MAILED IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS MAIL PERMIT NO. 40 ARMONK, NEW YORK

POSTAGE WILL BE PAID BY ADDRESSEE

Jere Rutt
International Business Machines Corporation
800 N. Frederick Avenue
Washington Systems Center
Gaithersburg, MD 20879-3395

Fold and Tape **Please do not staple** Fold and Tape

C
A

Reader's Comments

IBM 9270/9274 Voice Response Unit Installation and Training Techniques

Publication No. GG66-3119-01

Use this form to tell us what you think about this manual. If you have found errors in it, or if you want to express your opinion about it (such as organization, subject matter, appearance) or make suggestions for improvement, this is the form to use.

To request additional publications, or to ask questions or make comments about the functions of IBM products or systems, you should talk to your IBM representative or to your IBM authorized remarketer. This form is provided for comments about the information and the way it is presented.

When you send information to IBM, you grant IBM a nonexclusive right to use or distribute the information in any way it believes appropriate without incurring any obligation to you.

Be sure to print your name and address below if you would like a reply.

Name

Address

Company or Organization

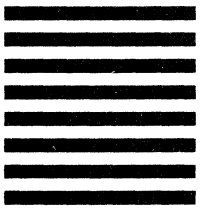
Phone No.

Reader's Comments
GG66-3119-01

Cut o
Alon

Fold and Tape | **Please do not staple** | Fold and Tape

NO POSTAGE
NECESSARY
IF MAILED IN THE
UNITED STATES



BUSINESS REPLY MAIL

FIRST CLASS MAIL PERMIT NO. 40 ARMONK, NEW YORK

POSTAGE WILL BE PAID BY ADDRESSEE

Jere Rutt
International Business Machines Corporation
800 N. Frederick Avenue
Washington Systems Center
Gaithersburg, MD 20879-3395

Fold and Tape | **Please do not staple** | Fold and Tape

Cu
Al

Reader's Comments

IBM 9270/9274 Voice Response Unit Installation and Training Techniques

Publication No. GG66-3119-01

Use this form to tell us what you think about this manual. If you have found errors in it, or if you want to express your opinion about it (such as organization, subject matter, appearance) or make suggestions for improvement, this is the form to use.

To request additional publications, or to ask questions or make comments about the functions of IBM products or systems, you should talk to your IBM representative or to your IBM authorized remarketer. This form is provided for comments about the information and the way it is presented.

When you send information to IBM, you grant IBM a nonexclusive right to use or distribute the information in any way it believes appropriate without incurring any obligation to you.

Be sure to print your name and address below if you would like a reply.

Name

Address

Company or Organization

Phone No.

Reader's Comments
GG66-3119-01

IBM®

Cut
Alor

Fold and Tape | **Please do not staple** | Fold and Tape

NO POSTAGE
NECESSARY
IF MAILED IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS MAIL PERMIT NO. 40 ARMONK, NEW YORK

POSTAGE WILL BE PAID BY ADDRESSEE

Jere Rutt
International Business Machines Corporation
800 N. Frederick Avenue
Washington Systems Center
Gaithersburg, MD 20879-3395

Fold and Tape | **Please do not staple** | Fold and Tape

C
A

IBM®

GG66-3119-01

Printed in U.S.A.