IBM

International Technical Support Centers

IBM 3174
SUBSYSTEM CONTROL UNIT
INSTALLATION GUIDE

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The authors of this document are:

Abstract

This document describes the Installation, Operation and New Features of the 3174.

The information contained in this document is based on installation experience at the International Technical Support Center Raleigh.
WS   118 pages

Preface

This document provides an introduction to the IBM 3174 Subsystem Control Unit. It describes the main components of the machine and microcode comparing and contrasting with the IBM 3274 where appropriate, placing most emphasis on new features and facilities. This document is the result of several residencies at the ITSC Raleigh and some of the chapters made are as a direct result of installing several models of the IBM 3174.

This document has been written for Systems Engineers and technical members of customers' organizations involved in the installation, customization and maintenance of the IBM 3174 Subsystem Control Unit.

A very basic knowledge of IBM 3270 Information Display System has been assumed. However, very little knowledge of the IBM 3274 Subsystem Control Unit has been assumed. For experienced 3274 users, the IBM 3174 and IBM 3274 are compared and contrasted where this is deemed to be useful to them. Because of this all chapters should be useful to both sets of readers.

ORGANIZATION OF THIS GUIDE

This Installation Guide contains the following chapters:

1. Introduction to the IBM 3174 Control Unit

    Describes the features and facilities provided by the hardware and microcode of the IBM 3174 Subsystem Control Unit and compares and contrasts them where applicable to the IBM 3274.

2. Pre-Installation Planning

    Discusses the several tasks that when completed prior to installation of the 3174, contribute to the smooth installation of the control unit.

3. Installation

    Discusses the physical installation of the IBM 3174 Subsystem Control Unit hardware

4. Microcode and Customization

    Describes the 3174 microcode and discusses its customization and installation.

5. The Token-Ring Attaching Models of the IBM 3174 Control Unit

    This chapter covers the 3174 attached to Token-Ring Network and presents topics like performance, connectivity, customization, backup/recovery and considerations to install them in different environments like VM/SP, MVS and VSE.

6. 3174 X.25 Support.

    Major aspects concerned with the 3174 working in a X.25 environment are documented here. Different scenarios of the 3174 with X.25 support are presented to the user.

And the following Appendices

- Appendix A - 3174 Publications
- Appendix B - 3174 Physical Specifications
- Appendix C - Large Control Unit Card and Adapter Functions
- Appendix D - How to Select a Patch
- Appendix E - 3174 Large Control Unit Plug Chart
- Appendix F - 3174 Customization for Token-Ring Network
- Appendix G - Examples of 3174 VTAM/NCP Definitions
- Appendix H - System/36 Configuration Panels for Token-Ring Network

RELATED PUBLICATIONS

GA23-0058	IBM 3270 Library User's Guide (For List of 3270 Publications)
GA27-3361	IBM Cabling System Planning and Installation Guide
GA23-0214	IBM 3174 Subsystem Control Unit Customizing Guide
GA23-0337	IBM 3174 Models 1L,1R,2R and 3R User's Guide
GA23-0333	IBM 3174 Models 51R,52R and 53R User's Guide
GA23-0313	IBM 3174 Models 81R and 82R User's Guide
GA23-0217	IBM 3174 Help Desk Reference
GA23-0218	IBM 3174 Subsystem Control Unit Functional Description
GA23-0213	IBM 3174 Subsystem Control Unit Site Planning

A description of the IBM 3174 Subsystem Control Unit documentation may be found in Appendix A.

Table of Contents

1.0 The IBM 3174 Subsystem Control Unit

1.1 Introduction to the IBM 3174 Subsystem Control Unit

The IBM 3174 Subsystem Control Units provide local channel attach, remote attach, local area network attach, and local area network gateway attachment of the IBM 3270 Information Display System displays, printers, and workstations to IBM host processors via System/370 architecture channels, telecommunications links, or IBM Token-Ring Networks. Optional attachment of ASCII terminals to access both IBM and ASCII hosts via telecommunications links will also be provided in the future.

They are functionally equivalent to the IBM 3274 Control Unit models 41A, 41C, 41D, and 61C, and, in addition, offer improved price/performance, usability, and increased capabilities.

A significant departure from the 3274 Models however is that there is only one Local (Channel Attached) Model (Model 1L) of the IBM 3174 Subsystem Control Unit for both SNA and non-SNA environments. The 1L can be attached in either environment with a simple microcode customization option. The benefit of this is that a customer can now move to SNA without having to make model changes. Alternatively, customers can move equipment more easily between differing sites within their organization.

In addition the 3174 microcode supports the use of either EIA RS-232/CCITT V.24 or CCITT V.35 interfaces on the Models 1R, 51R and 81R. All that is required is a simple communications cable change unlike the 3274 which required two different features.

1.1.1 Performance

The performance of the 3174 Model 1L is significantly better than the performance of 3274 models 41A and 41D, in most cases, particularly with control unit terminals and workstations using CUT mode. The Model 1L is designed as an SNA machine internally so it is better able to make use of its facilities when used in an SNA environment.

The performance of the link-attached models still depends on the TP link. The faster the link, the faster the throughput.

One place where the better performance will show on all models is during customization and IML (Initial Microcode Load). The increased performance of the 3174 helps to significantly reduce the amount of time spent on each of these operations. *Performance Guidelines for IBM 3X74 Attached Workstations ZZ20-4167*, contains more detailed 3174 performance information.

1.2 Description

The 3174 Subsystem Control Unit Models 1L, 1R, 2R, and 3R are large cluster control units for attaching up to thirty-two 3270 Information Display System terminals.

The 3174 Subsystem Control Unit Models 51R and 52R are medium cluster control units for attaching up to sixteen 3270 Information Display System terminals.

The 3174 Subsystem Control Unit Models 81R and 82R are the small cluster control units for attaching up to eight 3270 Information Display System terminals.

They are designed and built with state of the art CMOS technology and with Very Large Scale Integration (VLSI) circuitry. This new technology design produces advantages of smaller size, faster circuitry, less power, additional control storage capacity, and allows for growth.

Each control unit is shipped with a host-attachment interface adapter, 1.0M bytes of control storage, and a 1.2M byte 5.25-inch diskette drive.

1.2.1   Host Attachments

There are three basic methods of physically attaching the IBM 3174 to the host. They are

- S/370 Channel - Model 1L

- Communications Link - Models 1R, 2R, 51R, 52R, 81R and 82R

- Token-Ring - Models 3R and 53R

1.2.1.1   Local Channel Attach

- Model 1L - S/370-architecture channel interface for SNA and non-SNA attachment.

The 3174 Model 1L has Data-Chaining Interlocked and High Speed Transfer channel operational modes. This can provide for channel data rates up to 1.0 and 1.25 megabytes per second, respectively.

1.2.1.2   Remote Link Attach

The 3174 remote attach models provide improved communications capabilities. The base control unit will provide the following interfaces as is applicable to the 3174 model selected. Communication protocol (SDLC, BSC, or X.25) is inherent to the customizing procedure.

- Model 1R, Model 51R and Model 81R - EIA RS-232C/CCITT V.24 and CCITT V.35 interfaces for SNA/SDLC, BSC, or X.25 remote link attachment. For operation up to a maximum speed of 9.6K bps for BSC, 19.2K bps for X.25 and 64Kbps for SNA/SDLC.

- Model 2R, Model 52R and Model 82R - X.21 interface (CCITT V.11) for SNA/SDLC or X.25 remote link attachment. For operation up to a maximum speed of 64K bps for SNA/SDLC.

1.2.1.3   Token Ring Attach

The IBM 3174 Models 3R and 53R provide host attachment via the IBM Token-Ring Network. These models communicate with the host via an IBM 3720 or 3725 Communications Controller with the NCP/Token-Ring interconnection (NTRI) facility of ACF/NCP Version 4 Release 2, or via a 3174 Model 1L with the IBM Token-Ring Network 3270 Gateway optional feature (#3025).

1.2.2   Terminal Attachment

The new control units offer increased flexibility for terminal attachment. They can be configured to connect terminals directly, via 3299 Terminal Multiplexers, via optional Terminal Multiplexer Adapter features (Models 1L,1R,2R & 3R only), or by a combination of these attachment options. A base large cluster control unit (model 1L, 1R, 2R or 3R) has an integrated four-port terminal adapter which permits up to 4 terminals to be directly attached, or by using one of the following, up to a maximum of 32 terminals can be attached:

- One to four IBM 3299 Terminal Multiplexers.

- One to four Terminal Multiplexer Adapter optional features (#3103).

- Any combination, up to four, of the 3299 Terminal Multiplexers and Terminal Multiplexer Adapter optional features.

The medium cluster control units (models 51R, 52R, & 53R) have similar attachment flexibility, but with a maximum attachment capability of sixteen terminals. A base control unit has an integrated nine-port terminal adapter which permits up to nine terminals to be directly attached, or by using one of the following, up to a maximum of 16 terminals can be attached:

- Two 3299 Terminal Multiplexers.

- One 3299 Terminal Multiplexer and connecting up to eight terminals directly.

The small control unit (Models 81R and 82R) have a maximum attachment capability of eight terminals. The base control unit provides an integrated four-port terminal adapter which permit up to four terminals to be directly attached, or using a 3299 Terminal Multiplexer, attached to port 0, a maximum of eight terminals can be attached, in this case remaining ports of the control unit are disabled.

1.2.2.1 IBM Cabling System

When using the 3174 with IBM Cabling System data-grade media, cabling to terminals is via direct attachment to the IBM Cabling System media. A balun cable assembly is not required at the control unit end of the cable. Attached devices may still need baluns at their end.

1.3 New Features

1.3.1 IBM Token Ring Network 3270 Gateway

An optional feature, IBM Token Ring Network 3270 Gateway feature #3025 is available for an IBM 3174 Subsystem Control Unit Model 1L using SNA protocol. This feature provides the capability for a combination of up to 140 IBM PCs as network stations, 3174 Models 3R or 53R, or any Physical Unit type 2 (PU2.0) on an IBM Token-Ring Network to communicate with an IBM host, through the 3174 Model 1L. The workstations attached to the 3174 Model 1L can coexist and operate concurrently with this feature.

The IBM Token Ring Network 3270 Gateway feature will not participate in, and will not be an inhibitor to, communications that occur on the ring to which this feature is attached.

1.3.2 Second Diskette Drive

A second 5.25-inch diskette drive with 1.2M byte capacity is available as an optional feature (#1046). It is required for down-loading operational microcode to DSL (DownStream Load) devices such as the IBM 3179-G, IBM 3193 or the IBM 3290 Display Panel. It is also required for downloading operational microcode to the Asynchronous Emulation Adapter optional feature (#3020).

While it is possible to use most off-line diskette procedures without the optional second diskette drive, there are some that require it (see Offline Utilities description below). Although not required, having the optional second diskette drive reduces diskette swapping when customizing a 3174 and when running most off-line diskette utility procedures.

The 3174 Models 81R and 82R do not support the second diskette drive.

1.3.3 Asynchronous ASCII Support

1.3.3.1 General Description

The Asynchronous Emulation Adapter (#3020) provides facilities to handle asynchronous ASCII communications. 3270 emulation from ASCII displays and printers as well as ASCII emulation from 3270 devices is possible.

This feature consists an adapter card and microcode. An auxiliary diskette with microcode for the adapter is distributed with the hardware.

This feature can not coexist with the IBM Token Ring Network 3270 Gateway feature #3025 and can not be installed in the 3174 Models 53R, 81R or 82R.

The second diskette drive feature is a prerequisite for this feature in order that it may download operational microcode.

1.3.3.2 Asynchronous Adapter Description

Each adapter provides eight ASCII ports. 3174 Models 1L, 1R, 2R, and 3R can each have up to three adapters providing up to 24 ports. Models 51 and 52 can have one adapter, providing up to eight ports. These ports are in addition to the maximum available on SNA control units. The number of device addresses supported by non-SNA controllers is not expanded.

The adapter supports: full-duplex, character-mode, asynchronous transmission of seven-bit ASCII data with parity. Odd, even, mark, space, and no-parity coding are supported.

Ports are configurable in any combination of ASCII Terminal Emulation, 3270 Terminal Emulation, or ASCII Pass-Through.

Each port provides an EIA RS-232C electrical interface, and supports transmission speeds of 300 to 19.2K bps via modems over switched or non-switched communications facilities or via direct connection, without modems.

Connection to the RS-232C interface can be up to 12 meters (40 feet).

The following asynchronous flow controls are supported:

- Xon/Xoff,
- DTR,
- CTS

1.3.3.3 ASCII Emulation by 3270 Devices

This mode of operation of the Asynchronous adapter provides the capability for IBM 3270 display terminals to emulate the following ASCII display terminals:

- IBM 3101
- DEC VT-100

Attached 3270 printers can also emulate an ASCII printer and provide ASCII host print support.

3270 devices continue to communicate with IBM applications via current attachment methods.

The following CUT displays are supported for ASCII Display Terminal Emulation:

- 3178
- 3278
- 3180
- 3191
- 3192
- 3179/3279 (operating in four-color mode)
- 3270-PCs (operating in CUT mode)

The following printers are supported for ASCII Printer Emulation:

- 3287 Model 1 or 2

- 3230 Model 2

- 3262 Model 3 or 13

- 3268 Model 2

1.3.3.4 3270 Emulation by ASCII Devices

Both IBM and non-IBM ASCII displays and ASCII printers can communicate with the IBM applications through 3270 emulation support via full duplex asynchronous communication lines to the 3174 or via the standard ASCII upstream method.

Personal computers emulating one of the supported ASCII displays can also communicate with the IBM applications.

The following ASCII displays are supported for 3270 Display Terminal Emulation:

- 3101

- 3161/3163

- DEC VT-100, VT-102, VT-52, VT-131, VT-220 (emulating a VT-100), VT241[1]

- Televideo 912 ,920, 925, 950, and 970 [2]

- Lear Siegler ADM 3A/5, ADM 11/12, 11/78 [3]

- ADDS Viewpoint A-1, A-2, Viewpoint 78 [4]

- Esprit-Hazeltine 1500 [5]

- Esprit 78

- Hewlett Packard 2621 terminals[6]

- Any Personal Computer that emulates one of these terminals.

The ASCII displays supported for 3279 S2A emulation are:

- IBM 3164

- DEC VT-241 [1]

The general requirements for ASCII printers to be supported for 3270 Printer Emulation are:

- Transmission must be serial.

- Transmission speed must match the speed of the attached device.

- The electrical interface must be RS-232C.

- Maximum of 132 print positions (1920 character buffer).

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[1] Trademarks of Digital Equipment Corporation

[2] Trademarks of Televideo Systems Inc.

[3] Trademarks of Lear Siegler Inc.

[4] Trademarks of Applied Digital Data Systems Inc.

[5] Trademarks of Hazeltine Corp.

[6] Trademark of Hewlett Packard

- Lines per inch set to printer power on default value.

- The printer must fold upper/lower case combinations into all lower or all upper case.

- The parameters for single or double spacing, page length, new line, and form feed must be specified during 3174 customization for this feature.

- The ASCII printer must support the following ANSI commands:

  - Carriage Return (Control M, hex OD),

  - Line Feed (Control H, hex OA),

  - Bell (Control G, hex O7).

The ASCII displays, printers and Personal Computers can also communicate with ASCII applications in Passthrough mode via this adapter without breaking the connection to the 3174.

1.3.3.5 Keyboards

For ASCII Terminal Emulation, IBM typewriter, APL, and text keyboard types are supported via a generic ASCII keyboard map.

For 3270 Terminal Emulation, the user can choose between:

- A generic keyboard map.

- A specific map designed for each two supported ASCII terminal types.

1.3.3.6 Host Attachment

ASCII host attachment is via any of the adapter ports, as specified through a new menu known as the Connection Menu.

IBM host attachment is via the host attachment interface of the 3174 model in which the adapter is installed.

1.3.4 Serial OEM Interface (SOEMI)

A Serial OEM Interface (SOEMI) is a base function for a non-SNA 3174 Model 1L Subsystem Control Unit that extends attachment capabilities to a variety of industry devices of independent manufacturers for engineering, scientific and manufacturing environments. A protocol based on structured fields (Extended Data Stream) provides the user programming flexibility.

1.3.4.1 Other OEM Adapters

Attachment of instrumentation, measurement and control, and other equipment can be provided via OEM adapters that provide appropriate conversion and control functions to industry standard bus interfaces such as IEEE 488, IEEE 696, IEEE 796, etc. Applications such as: controlling and measurement, robotics, process control, voice synthesis/recognition, medical applications and many others could then be implemented via the SOEMI support.

1.4 Microcode

1.4.1 Microcode Functional Compatibility

These new control units are functionally equivalent with presently available 3274 Models 41A, 41C, 41D, and 61C Control Units operating with Configuration Support D microcode at release #65, with the following exceptions:

1. A Dataphone Digital Data Service (DDS) Adapter is not offered.

2. IBM 3278 Model 1 displays (960-character buffer) and use of the 960 character buffer format by printers are not supported.

3. The IBM 3278/3279 Personal Computer Attachment features (#5315,5316/#5325,5326) are not supported.

   > *Note:*This refers to a method of attaching a PC System Unit to a 3278 or 3279 display in order to make use of its keyboard and monitor and to provide host communication for the PC. It *does not* refer to 3278/79 Emulation on the IBM PC nor does it refer to the IBM 3270-PC.

4. Intelligent Printer Data Stream (IPDS) available in Release 2.

The 3174 adheres to the device attachment architectures specified in the following documents:

1. IBM 3174, 3274, 3276 Control Unit to Device Function Information.

2. IBM 3174/3274 Control Unit to Distributed Function Device Product Attachment Information.

The 3174 Subsystem Control Unit sequence of commands and their timing will be different than the 3274 sequence and timing. Also, additional checking is provided in the 3174 to insure device delays do not cause a "Host Lock Out" for other attached devices. In general, the 3174 performance is improved. The 3174 supports the devices listed in the M3174 pages under Terminal Attachment and the IBM PC 3270 emulation software products listed above under "Software Requirements". OEM attachments and software not specifically identified should be te d by the customer to verify correct operation.

1.4.2 Customization

The customization of 3174 Subsystem Control Units has been significantly enhanced through the following elements:

- Error messages presented on screen.

- Optional selection of Printer Authorization Matrix definition panel,

- Reduced number of questions for equivalent function.

- Reduced diskette swapping.

- Expanded use of defaults.

- Reduced machine execution time.

1.4.3 3274 RPQs Included in Base Microcode

Increased control storage capacity, coupled with new optimized control microcode, results in more usable functions in a base control unit, without the need for additional control storage, features, or RPQs to make these functions available. Storage features are available to further increase the control storage capacity when needed to support optional IBM 3174 Subsystem Control Unit functions. Several 3274 microcode RPQs have been included into the base control microcode for the new control units. Listed below are the RPQs which have been included. The 3274 RPQ numbers are indicated in the parentheses.

- 3274 Diskette Processing Aid - (8K1071 & 8K1072).

    NOTE: Copy function can be done with the base 3174, but full copy capability requires the optional 1.2 MB Diskette Drive (#1046).

- 3274 Unsupported Control Code Translate - (8K0980).

- Keyboard Code 8K1038 with and without Numeric Lock - (8K1164 & 8K1165).

- 3274 Entry Assist - (8K1147)

- Programmed Symbols Load for Altered Screen - Configuration Support C & D - (8K1073 & 8K1168).

- RS232-C at 19.2K bps - (8K1308) & (8K1309).

- Distributed Function Terminals (DFT) Display Performance Enhance - (8K1311).

- Coax Timeout Extend (Type A) - (8K1042 & 8K1151).

- 3299 Terminal Multiplexer Adapter - (8K1155, 8K1156, 8K1180, 8K1181, 8K1182, 8K1183 & 8K1194).

- X.21 Short Hold Mode (7H0497).

1.4.4   Response Time Monitor

Response Time Monitor is a base function in the new control units. It provides for enhanced network management by permitting the accurate measurement and recording of transaction times between an inbound host attention (AID) and a user defined transaction end.

1.4.5   Microcode Utilities

Offline procedures are provided to aid in the configuring and managing of 3174 microcode and to provide offline diagnostic functions. They are invoked from a "Master Menu" panel that is displayed on a Control Unit Terminal (CUT) attached to port 0. 3174 Offline Procedures include:

- Customize the Control Diskette - Provides the ability to:

    - Configure control unit microcode.

    - Define printer authorization matrix.

    - Merge RPQs.

    - Modify keyboards.

- Merge Downstream Load: Provides the ability to merge the microcode required by two or more downstream-load terminals, such as the 3290, 3193, and 3179/3192 Model G, on to one diskette. Use of this procedure requires the 1.2MB Diskette Drive optional feature (#1046).

- Copy Files: Through its seven variations, provides a means of duplicating diskettes, copying specific data areas, and copying with configuration modifications from one Control diskette to another. The functions of the 3274 "Diskette Processing Aid" RPQ 8K1071 are included in this procedure. The "Full Copy" and "Modify and Copy" options require the 1.2MB Diskette Drive optional feature (#1046). This feature is not required for the other Copy Files options, but their usage is enhanced with it, since the need for diskette swapping is reduced.

- Diagnostics: Provides a full range of offline diagnostics. Diagnostics are selected from a menu panel when this utility is invoked.

- Microcode Upgrade: Provides a process to update a newly released Control diskette with the configuration data from the down level Control diskette, thus greatly reducing the time required to execute this task.

- Encrypt/Decrypt: Provides facilities to load a master key value into the Encrypt/Decrypt adapter, display the Verify Pattern that is resident on the Encrypt/Decrypt diskette, verify the current master key value, and test the Encrypt/Decrypt feature. It is applicable only to Models 1R, 2R, and 3R that have the Encrypt/Decrypt feature (#3680).

- Identify Customizing Keyboard: Expands the types and configurations of keyboards from which the 3174 customization process can be executed. It is applicable primarily in World Trade Corporation countries, due to the variability of the keyboard layouts found there.

1.4.6 Intelligent Printer Data Stream (IPDS) Support

Intelligent Printer Data Stream (IPDS) support for the IBM 4224 Printer, and future IBM APA (All Points Addressable) printers, is a structured field approach to management and control of printer processes and is designed to allow the presentation of text, raster images, vector graphics, bar codes and previously stored overlays at any point on a page. IPDS commands within the data stream also enable the host processor to control media handling, error recovery, and the down-loading and management of symbol sets (fonts) and printer stored objects, such as overlays and page segments. The printer can later use these stored objects to construct a printed page. IPDS can significantly reduce the load on the host processor.

Printers capable of IPDS will be supported by SNA and non-SNA control Units.

IPDS depends on programming support outside the the control unit.

1.5   Communications Network Management

Communication Network Management Products will support IBM 3174 error detection and configuration reporting. However, the enhancements and changes made in the 3174 require the following programs at the specified levels for central site problem determination:

Required Program levels for central site problem determination:

- For all models except 1L with optional IBM Token-Ring
    Network 3270 Gateway feature (#3025).

        NPDA V3R2 - APAR PP43332 (PTF UP90223) for MVS/370
             - APAR PP43337 (PTF UP90224) for MVS/XA
             - APAR VM22413 (PTF UV90110) for VM
        -OR-

        NetView

- For Model 1L with the optional IBM Token-Ring Network
    3270 Gateway feature (#3025).

        ACF/VTAM V3R1.1

        -AND-

        NetView

Response Time Monitor (RTM) is a base IBM 3174 function. It is supported at the host by:

- NLDM Rel 2 for VM/SP

- NLDM Rel 3 for MVS/370, MVS/XA, and VSE

- NetView

RTM may also be usefully used without host support.

1.6 Personal Computer Support

1.6.1 IBM PC 3270 Emulation Support

The 3174 Subsystem Control Unit supports IBM Personal Computers configured to operate with:

- The IBM Personal Computer 3278/79 Emulation Control Program Version 1, P/N 6024134 and Version 2, P/N 8665780.

- The IBM PC 3270 Emulation Program, Entry Level, P/N 59X9904.

- The IBM PC 3270 Emulation Program Version 3.0, P/N 59X9969.

- The RT Personal Computer 3278/79 Emulation Program, PP 5669-052.

- IBM Virtual Machine/Personal Computer Release 2 P/N 6467040.

- PC/VM Bond Release 2 P/N 6467022.

1.6.2 IBM PC File Transfer Support

The 3174 Subsystem Control Unit supports the following Host File Transfer Programs which allow the above PC configurations to perform file transfers.

- PC Bond, PP 5664-298

- VM/PC, PP 5664-319

- MVS/TSO, PP 5665-311

- VM/SP, PP 5664-281

- DISOSS, P/N 6476054 Version 1 Release 2

- PROFS, PP 5664-309 Version 2

1.7 Enhanced Language RPQs

The following enhanced language RPQs which are available for the 3174 generally provide keyboard and, when applicable, bi-directional cursor support for 3270 terminals. Refer to the corresponding RPQ DPT for further details of the support provided: Arabic-XBASIC (8K1306), Belgian (8K1346), Cyrillic (8K1304), Greek (8K1303), Hebrew-Bulletin (8K1307), Icelandic (8K1301), ROECE Latin (8K1305), Swiss (8K1345), and Turkish (8K1302).

The following priced language RPQs which are also available for the 3174 also generally provide keyboard and, when applicable, bi-directional cursor support for 3270 terminals. Refer to the corresponding RPQ DPT for further details of the support provided: Arabic-XCOM2 (8D0312), Hebrew-A (8D0311), and Yugoslav (8D0313).

2.0 Pre-Installation Planning

2.1 Introduction

The smooth installation of any system or subsystem is normally directly proportional to the amount of thought that has been focussed on the project prior to installation. The 3174 is no different in this respect to any other system or subsystem.

Customers that are familiar with the installation of 3274 Control Units will find that the 3174 is an easier proposition for the reasons outlined in the introductory chapter. However this does not mean that it should be approached in a less professional manner, because by using the new aids and techniques that are provided by the 3174, a customer can make real productivity savings on the installation, and maintenance of the device.

2.1.1 Planning

The starting point prior to installation is the IBM 3174 Subsystem Control Unit Site Planning Manual (GA23-0213).

A Site Planning Checklist is contained in the IBM 3174 Subsystem Control Unit Site Planning Manual (GA23-0213). It will not be reproduced here. Please use the one contained in that manual.

The installation may not always be of a new 3174. It could be one of the following:

- Installing a new 3174 or expanding an existing 3174.

- Relocation of a 3174.

- Replacing and removing existing control units.

2.1.2 Host Attachment

Host attachment of the channel and link attached control units is exactly the same as an equivalent 3274. I/O and NCP generation should be done as though an equivalent 3274 was being attached.

2.1.2.1 Local

The 3174 Model 1L attaches to the host via Channel Interface Cables (Bus and Tag) in exactly the same way as the 3274 channel attach models. This is the only part of the installation procedure that needs to be done by the IBM service representative. The rest of the installation is CSU (Customer SetUp).

A difference between the 3274 and the 3174 however is that the Bus and Tag need to be between .455 meters (1.5 feet) and .915 meters (3 feet) longer to accommodate the 3174. The floor cutout for the cables is different as well. This is because the channel cables attach to the lower right of the 3274 whereas they attach to the top left of the 3174.

2.1.2.2 Remote (TP Link)

When attaching the Communications cable (also known as; modem cable, data set cable or TP interface cable) to the 3174, it is important that you use the cable supplied with the control unit. Cables from a 3274, will give problems. The reason for this is that the DCE interface is at the end of the IBM supplied cable, not at the 3174 Communications Adapter socket.

An example of this is the V.35 cable. It looks like a V.24 cable with an extra stub cable attached to the end of it. This is not the case and attempting to remove the V.35 stub cable and use the resultant cable as a V.24 cable will result in failure.

2.1.2.3 Token Ring (Upstream)

The 3174 Models 3R and 53R provide for token-ring communication to an SNA host. Communication to the host is through a gateway that can be either a an IBM 3725 Communication Controller with the Network Control Program Token-ring Interface (NTRI) feature, or a 3174 Model 1L with the Token-ring Network 3270 Gateway feature. The Token-ring Network 3270 Gateway feature is available only on the Model 1L.

The 3174 Models 3R and 53R have a token-ring adapter that provides attachment to the IBM Token-ring Network.

Like the other large control units models, up to 32 terminals may be attached to the model 3R and up to 16 terminals may be attached to the model 53R.

2.1.3 Terminal Attachment

The most significant terminal attachment features on the IBM 3174 are

* Three ways of attaching terminals

  1. Direct

     Up to 4 on large controllers and up to 9 on medium controllers.

  2. Via Integrated TMAs (Terminal Multiplexer Adapters)

     (Up to 32 terminals - on large controllers only)

  3. Via IBM 3299 Terminal Multiplexers

     Up to 32 terminals on a large control unit up to 16 on a medium control unit and 8 on a small control unit.

     A mix and match of the previous

* Direct attachment to the IBM Cabling System Type 1/2 data grade media; no baluns needed when the Dual Purpose Connector (DPC) is used.

2.1.3.1 Cabling

The IBM 3174 is designed to work with either coax or the IBM Cabling System without baluns. However you should be aware that if you use coax, attached devices may be up to 4920 feet (1.5km) away, whereas if the IBM Cabling System is used, attached devices may be up to 3280 feet (1.0km) away if the device requires a balun, or 4920 feet away if the device supports the DPC. These distances refer to the terminal if it is attached to a TMA (Terminal Multiplexer Adapter) or to the IBM 3299.

* Coax

  If you use coax then your cabling will be exactly the same as for a 3274.

* IBM Cabling System

If you use the IBM Cabling System then the 3174 has a useful new facility that you should know about.

Up until recently, in order to use a 3270 type device on the IBM Cabling System medium, it was necessary to put a balun (BALancer/UNbalancer) at both ends of the cable. This meant that all of the ports on a control unit had to have baluns attached and the device at the other end of the cable also had to have a balun.

Baluns are no longer required at the control unit end of the cable when a DPC is used. This is because the Terminal Adapter and the TMAs have been designed with the IBM Cabling System in mind. Devices at the other end of the cable may or may not need a balun depending on the device. For instance the IBM 3299 Model 2 does not need a balun at its end of the cable (3299 Model 2 requires the DPC).

- TMAs or 3299 Terminal Multiplexers

  - Large Control Units

    The large 3174 models have an adapter called the Terminal Adapter (TA) fitted to position 26 of the 3174 Logic Board. This has four BNC connectors and can be used to attach up to four terminals. However it would normally be used with either a TMA or an IBM 3299 Terminal Multiplexer attached to each of the four ports, giving a total of up to 32 ports on each control unit.

  - Terminal Multiplexer Adapter (3174 1L,1R,2R,3R only)

    This is a 3174 Adapter which is customer installable and is normally fitted in the logic board. These TMAs will use different position in the logic board depending on the 3174 model and other installed options, for reference a 3174 Plug Chart is shown in the appendix of this manual. Each TMA is then attached to one of the four ports of the Terminal Adapter with a short coax cable. You may now attach up to eight devices to the ports on the TMA. If you are using the IBM Cabling System, you do not need baluns when the DPC is used.

  - IBM 3299 Terminal Multiplexer

    The IBM 3299 Terminal Multiplexer is a device that multiplexes the data streams from eight category A 3270 devices onto a single cable. It has eight connectors for attaching the terminals and a single connector for attaching a cable to the control unit. The device is powered from a normal wall power outlet. There are three models of the 3299. The Model 1 attaches to the 3174 control unit via coax cable or the IBM Cabling System data grade cable with a balun at the 3299 end of the cable. The Model 2/3 may attach to the control unit via coax cable or the IBM Cabling System with a DPC.

    Terminals are attached to the Model 1 via coax cable or IBM Cabling System data grade cable with baluns. If you use the IBM Cabling System with the Model 2, a DPC at the 3299 end of the cable is required. In both cases, when used with the IBM Cabling System (ICS), some IBM terminals require baluns at their end of the ICS cable.

    You may attach IBM 3299 Terminal Multiplexers to any of the four ports on the Terminal Adapter instead of a TMA. This means that you may have a single cable (coax or IBM Cabling System) running out to a cluster of users, where you install an IBM 3299. It is at this point that you attach the terminals to the IBM 3299. This can give you considerable savings in the cost of cables and can make problem determination easier in the future by cutting the number of cables all running to the same area of the building. Or you may 'mix and match' TMAs and 3299s on a single control unit, thereby giving you the best of both worlds.

- Intermediate Control Units (5XR)

  TMA are not available with these 3174 models. These control units can attach up to 16 terminals. At the back of a medium 3174 are 9 BNC connectors labeled 0 to 8. All of these ports may be used to attach terminals, giving up to 9 devices on each control unit. However ports 0 and 8 are special ports and may have IBM 3299 Terminal Multiplexers attached to them. This means that by using one IBM 3299 attached to port 8 and attaching terminals to ports 0 to 7 you can have up to 16 terminals attached. Alternatively you may attach an IBM 3299 to port 0 and then attach the terminals to it. With this option then ports 1 to 7 can not be used.

- Small Control Units

  These Control Units can attach up to 8 terminals. At the back of the unit there are four BNC connectors labeled 0 to 3, you can have up to four terminals attached directly to these ports or attach an IBM 3299 to port 0 for a maximum of 8 terminals, in this case ports 1-3 can not be used.

2.1.4 Physical Installation

The physical installation of any of the IBM 3174 models is very easy. The new machines are all Customer Setup (CSU) so Customer Engineering (CE) is only needed to attach the Channel Interface Cables (Bus and Tag) to the Model 1L. CE can also change the priority of the control unit on the channel.

To install a 3174 is simply a matter of unpacking the machine, installing any features and cables. Microcode may be customized at this time from the planning worksheets and the machine IMLed.

All of the option adapters are in the form of customer installable modules. For example, in order to install 16 extra ports, it is simply a matter of plugging in two TMA adapters and plugging a short, internal coax cable between them and the Terminal Adapter.

For a full description please see the installation chapter.

2.1.5 Customization

This can be thought of in two phases:

- Planning - Mostly to be done prior to installation.

- Procedures - Mostly to be done at installation.

For a full description of this, please refer to the chapter on Customization.

3.0   Hardware Installation

3.1   Introduction

The 3174 is designated a Customer Setup (CSU) machine. The only operation that needs to be carried out by Customer Engineering (CE) is attaching a Model 1L to the Channel Interface Cables (Bus and Tag). The IBM Service Representative can also change the channel priority on the Model 1L from *High* (the factory setting) to *Low* as required by the customer.

To install a 3174:

1. Remove packing and place machine in the position that it will occupy when operational.

2. Review 3174 installation tips in different data bases available: RETAIN, EQUAL, OLSS, etc.

3. Power switch

    *   Model 1L - Turn the Channel Interface switch to offline, the power control to local and the power switch to 0 (off).

    *   All others - Move the power switch to 0 (off).

4. At this time install any CSU features that you have.

5. Route the power cord out of the front bottom of the control unit and plug it into a grounded electrical outlet.

6. Install the Utility diskette and run diagnostics as described in the Setup Instructions for the machine.

7. Communications Cables

    *   Model 1L - Get the IBM Service Representative to attach the Channel Interface and Power Sequencing (if used) cables to the machine.

    *   Remote Models - Attach the communications cable to the Data Communications Equipment, or equivalent.

8. Attach the terminal cables to the machine.

9. If the microcode has been customized by another member of the organization, then load the diskette in drive 1 plus the DSL diskette (if needed) in drive two and IML the machine; put the channel interface switch to online if it is a model 1L, and have the line started or terminals varied on.

    If you are the person doing customization, then take the previously completed worksheet, ensure that you have a CUT device on port 0 and carry on with the customizing procedures. On completion of these, IML the machine, put the channel interface switch to online if it is a model 1L, and have the line started or terminals varied on.

4.0   Microcode Customization

4.1   Introduction

Customizing is the term used to describe the process of tailoring the 3174 microcode supplied by IBM with the control unit on 1.2 MB, 5.25inch diskettes, to support various displays, and printers, and method of host attachment that a particular control unit will handle.

In the past, customization of 3274s has been a contentious subject. Some people will say how easy it is and other people will give the opposite view. This is because to someone skilled in the customization process, it is easy. However for someone approaching customization for the first time, possibly not knowing why they are doing certain tasks, this is sometimes not the case.

One of the reasons for these divergent views is the 3274s 'user friendliness', or comparative lack of it, plus there is often the need to treat each customization slightly differently than the last.

The introduction of the IBM 3174 simplifies the customization process for all users while still retaining the basic advantages of a customizable device:

- Flexibility.

- Ease of adding new features and functions.

- Ease of upgrading the microcode level.

However the process is now much faster and easier.

4.1.1   Microcode Differences Compared to IBM 3274

Before attempting to configure the 3174 control unit the user must be aware of some differences between the 3174 and the 3274 control units. There is a document which explains such differences: "3174 Subsystem Control Unit Host Programming considerations" (GA23-0325). This manual is also reproduced as an appendix of the "3174 Subsystem Control Unit Functional Description" (GA23 0218).

Part of the simplification of the customization of the 3174 is due to a number of questions being deleted from the process when compared to the 3274. A number of these questions were included in the 3274 customization in order to save using memory for functions that are not required. With the 3174, these functions have been included as standard. Among these functions now included without the need to specify them at customization time are:

- Entry Assist

- Extended Data Stream

- Distributed Function Terminals (DFT)

The category B terminal questions no longer required as these are not supported by the 3174.

Functionally the 3174 microcode is equivalent to Configuration Support D at Release #65 on the 3274.

The simplification is of course particularly relevant for the user with only a small number of control units, where the need to customize infrequently precludes the development of a high level of skill in this area. However, because of the considerably reduced amount of time required to customize, the large user can also

make considerable productivity savings in line with this time saving. Those larger organizations will also probably want to make use of Central Site Customizing, which is a future 3174 function. Future releases of this manual will cover this point in detail.

There are a some new questions for local (channel-attached) models, to support new functions. There is a complete matrix showing which Host/Channel systems support them in the "3174 Maintenance Manual Models 1L, 1R, 2R, and 3R", document number SY27-2572 under "Channel Attachment Information" in chapter 4th. These new questions are:

- #222 Support of Command Retry

  Under certain error condition the 3174 can request the channel to retry a command

- #223 Attention Delay Value (SNA)

  - Response range: 10-99 ms

  Queues inbound data during the specified delay period and then presents one attention at the end of the delay period

- #224 Mode of Data Transfer

  The 3174 will utilize the High-speed transfer option of DCI mode.

- #225 Channel Burst Size

  Applicable to local byte-multiplexer operation

  - Response Range: 0 - 7

  7 is the optimum, for one control unit in the channel

4.1.2 Microcode Diskettes

All 3174 microcode is delivered on 1.2MB 5.25 inch diskettes. They contain all of the microcode that is needed for the day-to-day running of the control unit plus various utilities used during:

- Customization

- Problem Determination

These diskettes consist of:

- *Control Diskette*

  One of these is delivered with every control unit. A backup may be made from an ordinary IBM High Capacity 1.2MB 5.25 inch diskette by using utilities in the Utility diskette. This may be done for all type 3174 diskettes and is a recommended procedure.

  Contains:

  - System Bring Up

  - Operational Code

  - Languages

  - Some Diagnostics

  After Customization is performed, the *Control Diskette* also contains:

  - Customization Parameters

  - Any Patches and/or RPQs applied

When a customized *Control Diskette* is IML'ed, the control unit is made "operational" (ready to put online and into production).

- *Utility Diskette*

- Contains the following code:

    - Configure Code

    - Merge DSL Code

    - Copy Files Code

    - Diagnostic Code

- *DSL (Down Stream Load) Diskette*

    These optional diskettes are required to support devices/features that need a Downstream Microcode Load (DSL) such the IBM 3290 Display Panel, the IBM 3179-G Graphics Display, the IBM 3193 Image Display or the AEA feature.

    - Contains Diagnostics, System Bring-Up, and microcode for DSL display stations.

    - Control Unit downstream loads this microcode to the display station.

    - DSL microcode can be merged onto one DSL diskette.

- *RPQ (Request for Price Quotation) Diskette(s)*

    This is an optional diskette that contains microcode required to support special features as required by a particular customer. The code is then merged onto the *Control Diskette*.

    - There may be up to 30 RPQs per diskette

    - 25K bytes of Control diskette space is reserved for RPQs

    - Up to 10 RPQs may be merged (installed) onto a single Control diskette

4.2   The Customization Process

Customization of the 3174 is in two stages. These are:

- Planning

- Procedures

Each of these stages may consist of a number of self-contained steps. Each stage may be carried out by a different person. Only the Configuring steps have to be carried out; all of the others are optional.

4.2.1   Planning

Planning should revolve around the worksheets found in the back of the IBM 3174 Subsystem Control Unit Customizing Guide (GA23-0214). These worksheets may be freely copied and a set should be made for each control unit to be customized. When doing this only include those sheets that you are actually going to use, e.g., you only need the BSC sheet from the various communications options sheets, if that is the protocol that you will be using. Additionally, if you do not intend to configure local copy facilities, do not bother to include the PAM (Printer Authorization Matrix) Worksheet.

There are ten possible steps during the planning phase, all of which are optional except Configuring. All except the Copy Files, Merge, and Upgrade have worksheets at the back of the manual. These worksheets should always be used. In the past the 3274 Configuration Data Cards (the one that SHOULD be filled out and then kept in the diskette pocket of the Control unit) have been dealt with better by some people than they have by others. If the 3274 Configuration Data Cards are not used then everything is OK until

you want to change something or something goes wrong, or the person who originally customized the 3274 gets promoted or leaves. It is much easier to re-configure 3174 microcode than the 3274 was. It is easier still if the original configuration is documented.

The ten Planning steps (remember only 1. always has to be done; the others are optional) are:

1. Planning to Configure/Reconfigure

2. Planning for Port Assignment

3. Planning for Response Time Monitor (RTM)

4. Planning for X.25

5. Planning to Define a PAM

6. Planning to Modify Keyboard

7. Planning to Copy Files

8. Planning for Merge Procedure

9. Planning for a Microcode Upgrade

10. Planning for Encrypt/Decrypt

We will now look at each of these steps in turn.

4.2.1.1   Planning to Configure/Reconfigure

Configuring needs to be done for each control unit and is similar to the operation needed on a 3274. However, as previously discussed in this document, it is now a smaller, easier task due to the reduction in the number of questions. It is the only step that has to be carried out in order to put the control unit into service; all of the other steps are optional.

At some time in the future a customer may wish to *Re-configure*. That is to say make changes to the hardware, the host, or terminal attachment. For example, perhaps some new printer has been added and one wishes to add a PAM or one has changed from BSC to SDLC host attachment. In this case a new worksheet should be made out reflecting the changes.

4.2.1.2   Planning for Port Assignment

This area is based on the response to question 116.

If you will be attaching DFT devices such as the IBM 3290 Display Panel or the IBM 3270 Personal Computer, and using their multiple session facilities, then you have to use either option *1* or *2*. There are three possible responses to this question:

The first option *0* is the default and the easiest. If you take this option the customization process will automatically assign port addresses and you will not see panels :117 and :118. However, if you have a Model 1L, 1R, 2R or 3R, then 32 port addresses will be assigned, whether you need them (i.e., you have 32 devices attached) or not. This can be wasteful on addresses. A similar process is true of the Models 5XR and 8XR although in these cases only 16 addresses will be assigned to Models 5XR and 8 addresses to Models 8XR.

The *1* option allows you to specify just the number of sessions per port, and the customization program deals with the assigning of addresses. In order to do this simply fill in the number of sessions per port in column *#IS* on the *117:* Port Assignment Worksheet. You could put a *0* against any port not required at this time so that addresses will not be allocated to it. When you press *pf8* during the actual configuring process, you will see that the customization program has filled in panel *:118* for you. You cannot change panel *:118*, it is for your information only. If you wish to update this worksheet in the future by adding or removing devices and you use this option, all of the addresses will be re-assigned by the customization program. In order to avoid this and keep the address assignment of the unchanged devices the same as before, you need to use option *2* below.

Option *2* is useful for the reasons above and is additionally useful if you have DFT devices, with multiple sessions, attached and wish to control the port assignments of individual sessions. If you leave this up to the program, then the ports will be assigned as follows. First addresses will be assigned sequentially to all of the primary ports starting at port zero. Then starting at the next available address, addresses will assigned to the secondary ports. Obviously if you wish to use addressing other than this, you need to use this option.

When using this option you need to do just a little more than with option *1*. In this case you have to enter the port addresses on :117 Worksheet in decimal. Once again the customization program will fill out sheet :118 for you.

4.2.1.3 Planning for Response Time Monitor (RTM)

This feature is a chargeable option on the 3274 and uses extra control storage. For these reasons some installations did not use RTM. Now that it is part of the base microcode, all customers should be encouraged to use it. Ideally it should be used as just part of the customers Communication Network Management (CNM) operation. However, even in a stand-alone form, it is a valuable tool in the management and control of information systems.

The first decision that you need to make when planning for RTM is, "Am I going to configure RTM?". If your answer is no then simply answer question 127 with two zeros and that is the end of it. As previously discussed, when RTM cost you extra money and storage, you may have thought that this was a good answer in your case. With those factors being removed you may like to revisit RTM and look again at its benefits, but this time at no extra cost.

If you decide to use RTM, then the first digit of question 127 asks you whether you have host support for RTM and its nature. Even without host support you can use RTM as a valuable management tool.

The second digit asks you for the point at which you wish to measure response times. It is up to you to decide which point of measurement is more meaningful to you. However, if this is the first time that you are using RTM, then this is a good opportunity to set some standards for your organization.

Having set question #127 to something other than two zeros, you will now get another panel during the configuration process, #128. This contains the measurement parameters and, like a number of questions during the customization process, IBM has supplied some default values. If you are using RTM for the first time, then why not just tick the worksheet for the defaults and let the configuration program supply the defaults this time. When you get more experience at using the data supplied to you by RTM, you may want to use parameters of your own or you may have a particularly sensitive application/set of users that you wish to monitor more closely than normal.

4.2.1.4 Planning for X.25

The major difference between configuring all the other protocols and X.25 is that if you answer question #101 with a 3 (X.25), then you get an extra panel *332* to fill in. This panel asks you for information about the X.25 network. The customizing questions refer too:

- Closed User Group

- Connection Size

- Window Size

- Packet Size

- Recognized Private Operating Agency

- Reverse Charge

- Throughput Class

This information can be got from the person in the organization responsible for X.25.

Please refer to the X.25 chapter in this manual for additional information.

4.2.1.5 Planning to Define a Printer Assignment Matrix (PAM)

This only needs to be done if you wish to have local printer defined (for doing screen copies).

It is one of those areas on the 3274 where some people will tell you how easy it is to do and others will disagree.

The new PAM definition is much easier both to understand and do. This is partly due to a re-design of the worksheet(s) and panel(s) used in the definition.

The PAM worksheet(s) (each worksheet having a corresponding panel) can be thought of as being in two parts; the top half and the bottom half. The top half defines the printer and the bottom half defines the terminals that may use it. By using multiple worksheets you may define up to 32 printers at five per worksheet (panel).

The first entry required is the *port* number of the first printer that you wish to define (this may not be port 26-00). The next field to enter is the *mode*. This can be:

*   *0 = System*

    In this mode the printer can only do host initiated print, it cannot do local (screen) copy. As this is the default mode, this is the reason for not needing a PAM if you only wish to use the printers for host printing and do not need/want local copy facilities.

*   *1 = Local*

    In this mode the printer can only do local copy. Although in an SNA environment the host can initiate a local screen copy.

*   *2 = Shared*

    In this mode the printer can do both of the above. For the implications of this and further information, please refer to the 3174 Subsystem Control Unit Customizing Guide (GA23-0214).

The b = next field, *Class*, allows one to group printers in classes. That is to say one may wish to group all of the same type of printer into a class, group all those printers on the same floor into a class, or group printers for none other reason.

Finally, in the bottom half of the page, simply put an "X" on the line corresponding with the printers number (line 1 for printer 1 defined above) under the port number(s) of any terminal(s) that you wish to authorize for local copy to that printer.

Installing the PAM is now simply a menu option described in the (*Procedures*) section of the Customizing Guide.

4.2.1.6 Planning to Modify Keyboard (CUT mode devices)

The purpose of the Keyboard Definition Utility is to create unique keyboard layouts to be used on IBM display stations supporting modifiable keyboards. With this utility, keyboard layouts can be tailored to meet specific user applications.

This utility is not for use with the DFT type of devices; like the IBM 3290 Information Panel, IBM 3179-G Graphics Display, or the 3192-G Graphics Display. Information to perform keyboard modification for these units will be find in the display description manual.

Most characters, symbols, and functions can be relocated, deleted, or duplicated from almost any key position.

Restrictions:

*   Display station used with this utility must be installed in port 00 of the 3174. Terminals with modifiable keyboard must be working in 3278/79 emulation mode.

*   Local keys which do not send scan codes to the controller should not be used for copy or exchange operation (SETUP, COPY or PLAY).

- Typamatic assignment can not be modified.

- Certain keys can not be copied or moved.

Question #136 refers to 4 unmodified keyboards:

1. Typewriter

2. APL

3. Data entry

4. IBM Office

Question 137 refers to which modified keyboards, IDs A, B, C, or D, are to be configured.

The total number of unmodified and modified keyboards can not exceed four.

Use the 'Planning to Modify Keyboards' chapter of the 3174 Customizing Guide along with the keyboard layout from the worksheet section. Decide which of the keyboards you wish to modify.

- Typewriter

- APL

- Data entry

- IBM Office

Fill out the keyboard layout worksheet using the 'Planning to Modify Keyboards' section of the 3174 Customizing Guide. Then take this and use it with the 'Modify Keyboard Utility.

4.2.1.7 *Planning to Copy Files*

These processes are so straight forward that planning worksheets are not required or provided. Copies can be done easily by one person. It is simply a matter of following the menus.

The options here are:

1. Full Copy

   This process duplicates a microcode diskette (including any configuration present) onto an ordinary 1.2MB IBM High Capacity 5.25 inch diskette. The utility takes just over two minutes for the actual copying process whereas the *Copy Configuration* process takes less than half as long at about one minute. Copying to an unformatted diskette adds about 30 seconds to the process.

2. Modify and Copy

   This is similar to the Full Copy but allows you to change some responses to questions on the diskette that you are copying to. This is done by means of a menu and is fully explained in the Customizing Guide. This is a useful utility for organizations that wish to produce 'Pattern Diskettes' which are then modified for individual control units.

3. Copy Configuration

   This copies a configuration from one Control diskette to another. You can use this utility to make a backup Control diskette. You should carry out this process immediately after customizing the control diskette; it saves time and trouble should the original be lost or damaged. It only takes about one minute for the actual copying process, a considerable saving over the 3274. This process requires the Target diskette to already be formatted and contain Control Diskette data.

4. Copy PAM

   This Utility is for copying the PAM from one Control diskette of the same configuration and release level to another.

5. Copy Modified Keyboards

   This utility copies modified keyboard tables from one Control diskette of the same configuration and release level to another.

6. Copy RPQs

   This copies merged RPQ data from one Control diskette to another. Be aware that doing so erases any RPQs already on the diskette that you are copying to. To move an RPQ from one diskette to another while retaining the original RPQs, use the Merge Procedure.

4.2.1.8 Planning for Merge Procedure

RPQs: This procedure allows you to:

* Include or omit RPQs resident on a Control diskette at IML time

* Delete RPQs from a Control diskette

* Merge RPQs from an RPQ diskette to the Utility Diskette

You use RPQ Merge to move RPQs from the IBM supplied RPQ diskette to the Utility diskette. From where you can include them or omit them from IML. This is done by choosing the Merge RPQ option from the configuration menu.

Remember an RPQ diskette can have up to 30 RPQs on it. A Control diskette has space for 10 RPQs whether they are *included* or *omitted* at IML. If you need to make space then you can delete unwanted RPQs from the Control diskette.

DSL Diskettes: This is the procedure for merging DSL diskettes. The planning for and performing of the procedure can be integrated into one task carried out by one person. No worksheets are required or provided.

If a 3174 has any DSL (DownStream Load) device/feature attached to it then it must have a second diskette drive for the use of the DSL diskette. Examples of DSL devices are the IBM 3290 Display Panel and the IBM 3179-G Graphics Display. The DSL diskette contains microcode needed by the DSL device which is entirely dependant on the 3174 for its microcode. When you switch on a DSL device, the only operation that it is capable of is attempting to receive its microcode from the 3174.

If you do not have any DSL devices in the cluster, then you do not need a DSL diskette. However, you may need the second diskette drive for other purposes described in this document. If you only have one type of DSL device, then simply put its DSL diskette into drive two. You do not need to use the merge procedure. However if you do have more than one type of DSL device in the cluster, then you need to merge the DSL diskettes onto one diskette that will reside in drive two.

The procedure is to call a menu and follow it to merge diskettes *from* one diskette (or more) *to* another.

4.2.1.9 Planning for a Microcode Upgrade

Periodically IBM may issue an upgrade *Control Diskette* for maintenance reasons and/or add new function to the controller. 3274 users will be familiar with this happening in the past. However, in the past this has generally meant re-customizing. Not too bad if the Configuration Data is handy. Microcode upgrade on the 3174 is dealt with by a utility on the *Utility Diskette* called 'Microcode Upgrade'. Using this utility the responses from the previously customized *Control Diskette* are copied onto the new later level microcode diskette. No re-customizing is required. This procedure is so straight forward no worksheet is provided or needed.

4.2.1.10 Planning for Encrypt/Decrypt

This is the procedure for changing the master key value.

It is only used when you have the Encrypt/Decrypt adapter installed in the 3174. It should only be performed by a specially authorized person within the organization.

You need:

- The adapter security key (this is a real key)

- A master Key Value (this is a code)

- A control Unit ID

This is a very simple operation fully described in the Customizing Guide. If you do not have any one of the above list or are unable to obtain the information requested in the guide, then you are probably not authorized by your organization and should get someone who is authorized to carry out this procedure.

4.2.2 Procedures

This section describes the physical customization of the microcode using the worksheets constructed in the previous (*Planning*) section.

Part Three of the Customizing Guide contains instructions on how to perform the procedure parts of customizing. There really is not much to be said about these. If you have carried out the Planning described in Section Two of the same manual, it is just a matter of entering the worksheet information onto a display attached to port zero of the control unit. Like the 3274 this must be a CUT (Control Unit Terminal) device such as a 3178 or similar. If you use a 3270-PC then it must be configured in CUT mode not DFT (Distributed Function Terminal). The Customizing Guide contains information on how to do the following:

- How to display the Master panel

- Identifying Keyboard

- How to Customize

- Configure the Control diskette

- Reconfigure the Control diskette

- Merge RPQs

- Modify Keyboards

- How to Merge DSL code

- How to Upgrade Microcode

It is not necessary to explain these here as they are really so easy to use, being menu driven. Once you get past the first two, you just follow the menus. The first two are the ones needed to start the process. To display the master panel:

- Put the Utility Diskette in drive one.

- Next hold *Alt 1* and press *IML*.

  - The Control Unit Display will read *40*

- Press *ENTER*.

The control unit will now load the utility diskette and the display will eventually read *7000*. If the display stops with a number in the range 7XXX where XXX can be any number, then check the status codes in appendix A of the Customizing Guide, e.g., 7080: There is some problem with the display attached to port zero. (It may not be powered up or the coax may not be connected). If the check light comes on, then look

up the number shown on the control unit Display in the Status Codes contained in the Help Desk Reference. This will tell you what the problem is.

If you wish to use one of the following keyboards to customize the control unit, then you need to identify it to the control unit using the procedure in Section 19 of the Customizing Guide *before* you start the customization processes.

- Austrian/German

- Belgian

- French AZERTY

- Japanese English

- Japanese Katakana

If your keyboard is not one of the above, then you should ignore this procedure.

5.0 The Token-Ring attaching Models of the IBM 3174 Control Unit

5.1 Introduction

This chapter discusses the 3174 display controllers which attach to the IBM Token-Ring Network. Readers will find useful tips regarding physical installation, customization, operating system considerations, backup/recovery, and performance. This chapter summarizes findings and experiences related to the installation of 3174 ring-attached models and gateways in a test environment with different operating systems and other Token-Ring attached devices.

5.2 IBM Token-Ring Concepts

The IBM Token-Ring Network is a general purpose Local Area Network (LAN) with the topology of a star-wired ring, using baseband signalling and token-passing protocols in conformance with the IEEE 802.5 standards for transmission control. Device attachments conforming to the IEEE 802.2 and 802.5 standards may communicate over an IBM Token-Ring Network.

The token passing technique for ring access control is based on a predefined bit pattern (24 bits), called a "token", which continuously circles the ring. When a station has data to transmit, it waits until its station adapter detects a "token" bit pattern (token bit = 0). When the station waiting to send receives a token, it starts transmission of the data.

The transmitting station creates a "frame" by setting the token bit to "1"; then it inserts destination and source addresses, control information and the data to be sent to the destination address. During the time the frame is being transmitted, no token is available on the ring (token bit = 1) and no other station can initiate a transmission (collisions on the ring are avoided). The frame is passed (received and retransmitted) by all stations on the ring until the station with a matching destination address receives it.

The destination station copies the data to its internal memory and retransmits the frame after setting control bits to indicate that it recognized the address and successfully copied the data.

When the frame returns to the originating station with control bits indicating successful transmission and receipt, it is removed from the ring. A new token is then created and transmitted, thereby permitting other stations to send data.

Successful interpretation and re-transmission of the 24-bit token around a ring requires a minimum 24-bit delay for each circulation of a token or frame. However, this does not add significantly impact performance because the ring has a transmission speed of 4 Megabits per second.

5.2.1 Types of Token-Ring Addresses

The Token-Ring adapter address field is 6 bytes (48 bits) in length and is, with minor variations in format, used as source address and destination address in frames sent from Network Station to Network Station.

There are two different formats of Token-Ring addresses. The first one is called "Universal address", which is the address given to the adapter card by the manufacturer at the factory; for this reason, it is also known

as the "Burned-in address" or "Hard address". The second format is called the "Locally Administered address", which is given by the user at customization time; it is also known as the "Soft address".

Each Token-Ring Adapter card has a unique burned-in 6 byte address. The uniqueness of this address is administered by the IEEE among vendors, and internally by the vendor.

For a Token-Ring environment without a host connection, the IEEE Universal address may be useful. The advantage of using the universal address is its guaranteed uniqueness and the avoidance of local address administration. Be sure to keep a list of stations, some topologic information, and the corresponding universal addresses for TRN Management.

In a Token-Ring environment with host connection through a gateway, the locally administered address can be used. As a matter of fact, this is the recommended address format to be used.

For a Token-Ring environment with a host connection, the use of universal addresses has some disadvantages. In some cases, the use of locally administered addresses is mandatory and in other cases, recommended.

Restrictions of Universal Addresses for host attached Token-Ring Networks:

- Generation of future ring-attached controllers or workstations is not possible because their Adapter Addresses are not known.

- If a defective adapter is replaced, the customization must be updated for the gateway and the ring-attached devices to reflect the new address before the user can re-establish connectivity.

- From an operational point of view (CNM and TRN Management) it may be useful to make the address informative, instead of a random number.

5.2.2 Naming Convention Example for Adapter Addresses

The Locally Administered addresses has 12 digits. The first four of them are fixed; the last eight digits may have any value less than or equal to "7FFF FFFF". The general format of such an address is:

4000 cdddddddd

The first digit "4" indicates a soft address; the next three digits are reserved.

The following is the naming convention used in the test configuration installed in our center; we considered mainly operational aspects for this naming convention. The topological information we used is the subarea number of VTAM or NCP, the ring number where the device is attached and a serial number within this ring. One digit is used to define the station type.

LOCALLY ADMINISTERED ADAPTER ADDRESS (12 DIGITS)	
FIXED (4 DIGITS)	VARIABLE (LAST 8 DIGITS)
4000	a bb cc ddd

a = Station Type
 	
    0 - Not used (optional)
    1 - 3720/3725 Gateway Addr.
    2 - 3174-01L Gateway Addr.
    3 - PC-Type downstream PU
    4 - 3174-03R/53R downstream PU
    5 - /36-Type downstream PU
    6 - other downstream PUs
    7 - ...
    8 ⊤   Not allowed, bit 0 used for
    9 ⊥   Functional Addr. Indicator

bb = Subarea number of NCP or VTAM
cc = Ring number
ddd= Serial number

5.2.3 Terminology

Since the Token-Ring Network is a new concept with recent implementation, it has created a new terminology for making reference to different stations or devices which attach to the ring. In this book, we are going to use the term "Gateway" to make reference to the device which passes information back and forth between the Token-Ring and an application in the host, and the term "Down Stream PU" (DSPU) to make reference to any ring-attached device which uses the gateway to communicate with an application in the host.

The 3174 Model 01L with the 3270 Token-Ring Gateway feature will be called "3174 Gateway" and the 3174 Model 03R or 53R (which attaches to the ring), will be called "3174 DSPU". Ring-attached PCs and System/36s using the 3174 Gateway facilities will be called "PC DSPU", "S/36 DSPU" or simply "DSPU".

5.3   3174 Gateway: Model 01L

If Token-Ring attached devices want to communicate with a host system, they need the help of a gateway which maps the Token-Ring protocols and frames to certain SNA protocols and request units.

This section discusses the IBM 3174 Display System Control Unit with the 3270 Token-Ring Gateway feature installed. The Token-Ring Gateway feature is available to the customer via the feature code #3025.

The IBM 3720/25 Communication Controllers with the NCP Token-Ring Interface (NTRI) installed can be also used as a gateway.

3174 Gateways in the same Token-Ring Network (but channel-attached to different hosts) cannot be used to establish a DSPU-LU to DSPU-LU cross-domain session. However, a device (LU) attached directly to a 3174 Gateway or attached to a downstream PU can establish a cross domain session with an application in another domain using the usual paths (channel-to-channel, local-local link or 372x twintail).

5.3.1   Devices Supported by the Gateway

The 3174 Gateway feature is designed to serve up to 140 Token-Ring attached devices. The service given by the gateway allows these devices to communicate with an IBM host. The number of devices supported by the 3174 Gateway varies according to the traffic flowing through it; please refer to "Performance Considerations", later on in this chapter for more information. The Gateway will not participate in communications on the ring itself, but will not be an inhibitor to such communications (e.g. between two PC workstations attached to the ring). Any combination of the following Token-Ring attached devices are supported by the Gateway:

- IBM 3174 Models 03R and 53R

- IBM PC using IBM 3270 Emulation Program, Version 3

- IBM PC using APPC/PC (in PU T2.0 emulation mode)

- IBM System /36 with the Token-Ring attachment feature

The number of SNA logical units (LUs) supported by each PU and the protocols used by these LUs are transparent to the Gateway. Each PU T2.0 attached to the Token-Ring appears to the host as a channel-attached SNA control unit having its own sub-channel address. These sub-channel addresses must be contiguous, starting with the channel address of the 3174 Gateway.

At 3174 customization time a list of Token-Ring addresses of the devices to which the 3174 Gateway is going to give service is defined. The 3174 Gateway will give service only to devices within this list. If DSPUs have to be added or deleted from this list a gateway customization is necessary to update the new configuration.

5.3.1.1   Natively Attached Devices

Except for performance considerations, the 3174 Gateway does not affect the operation of the displays, printers or workstations directly attached.

The following devices were tested native-attached to a 3174 Gateway:

- 3178

- 3179

- 3179G

- 3180

- 3192C

- 3193

- 3270PC

A CUT display should be attached to port zero at all times. This terminal is needed to run Online/Offline diagnostics and for customizing the controller.

5.3.2   3174 Gateway Highlights

This section presents a summary of the advantages and benefits of the 3174 Gateway. These items will be explained in detail later on.

- Easy Customization and Maintenance

  Personnel experienced in customizing the 3174 in the local channel environment will have to learn only a few new parameters. These new parameters have default values which (in most cases) will produce ready-to-run configurations.

  Customization for backup units can be avoided if the 3174 copy procedure is used. The microcode update procedure allows the customer to upgrade the microcode level of the 3174 Gateway. Each procedure will take about two minutes.

- Ring Error Monitor (REM) Facility

  This is an exclusive facility of the the 3174 Gateway. At the present time, it allows the Token-Ring errors to flow through the gateway and be reported to the NPDA under NetView in the host in the form of alerts. As several 3174 Gateways can be active at the same time in the Token-Ring Network, additional information can be added to identify which gateway is reporting the alerts.

- Dual Function: Gateway/Controller

  The 3174 Gateway can also be used as controller for its attached terminals. Our recommendation is to use DFT type of terminals, especially when performance is a critical factor.

- Efficient Backup/Recovery

  It is possible to define and IML two 3174 Gateways with the same Token-Ring addresses. The gateway which finishes the IML first will become the "main" gateway and the other will become the "backup" gateway.

- Performance vs Cost

  The 3174 Gateway can handle from 35 to 40 transactions per second (TPS) with a utilization of 65 to 70% at a low cost.

5.3.3   Hardware Installation

The IBM 3270 Token-Ring Gateway feature can only be installed in a local, channel-attached 3174-01L working in SNA mode. Multiple Gateways can be attached to the same Token-Ring, sharing the workload from this ring or backing up to each other. A 3174-01L equipped with the Token-Ring Network Adapter and physically connected to a Token-Ring performs the gateway function in addition to its job as an SNA controller for its attached terminals.

The IBM 3270 Token-Ring Gateway Feature consists of both hardware and microcode. The hardware part of this feature includes the Token-Ring Adapter card and a 2.4 m (8 ft) communications cable with connectors to the adapter and the IBM cabling system or a Multi-Station Access Unit (MSAU), respectively.

Do not install the Token-Ring Adapter without carefully reading the related Customer Setup Instructions. Installing the Adapter in the wrong slot can cause severe problems to the Host Systems.

The correct card location at the 3174 Gateway is slot 12. If there is already a card in slot 12 this card must be moved to the slot indicated in the Customer Setup Instructions. For additional information see the 3174 Large Control Unit Plug Chart in the appendix of this guide.

5.3.4 Gateway Microcode

The microcode part of this feature includes a Utility/Diagnostic diskette and a Configuration Support Control diskette with the microcode needed to handle the attachment of this control unit to the Token-Ring Network and to handle the gateway functions for the ring-attached control units. This microcode is based on Release 1 of the standard 3174 microcode and therefore supports all standard functions of the 3174. The control diskette will not contain support for BSC communications, non-SNA channel attachment, the attachment to ASCII hosts via the ASCII feature, X.25 or support for a 3174-03R/53R upstream communication over the Token-Ring. The Utility diskette contains offline test/utility routines and the customization package.

The current microcode level is: S1.0   ML 87036

The "S" stands for the special microcode version of the gateway feature. "ML" is the Microcode Level and is in a Julian date format. This microcode will not affect the installation or proper functioning of any RPQs available for installation in the 3174 control unit.

5.3.4.1   Ring Error Monitor (REM)

The 3174 Gateway microcode includes a function to report Token-Ring errors to the host. This function is called the Ring Error Monitor, and it performs integration and analysis of non-random error conditions on a real-time basis. In case of a failure of one of the stations in the ring, the REM derives information indicating the two consecutive adapters and the media in between them most likely to be causing a failure. Other type of ring errors are also accumulated and reported to NetView when thresholds have been exceeded.

This information is presented to the host on the SSCP-PU session in the form of Alerts, Link Events and PD Statistics.

This is one of the advantages of the 3174-01L Gateway compared to the 372x Gateway. It presents information about the entire Token-Ring Network to the host, while the TIC is only able to report its own status.

Token-Ring errors are shown at the operator panel of the 3174 as "8xx" status codes, and hardware errors of the Token-Ring adapter are shown as "3xx" status codes.

5.3.5   3174 Gateway: Performance Considerations

The performance information presented in this section is summarized from "Performance Guidelines for IBM 3X74 Attached Workstations" (ZZ20-4176-5), Chapter 5. The reader is encouraged to consult this document for better understanding of the facts and terminology presented here.

5.3.5.1   3174 Gateway Utilization

The 3174 Gateway functions as a "pass-through" multiplexer for Token-Ring Network traffic to and from a host. Its pass-through capacity determines the upper limit of the traffic flow, and therefore the total number of workstations and devices that can be usefully accommodated on ring-attached control units. The 3270 gateway does not care about source or destination device type, only about the characteristics and rate of the traffic.

The utilization of the 3174 with the Token-Ring Gateway feature can be summarized in the following table:

CU/Term	TPM	Utilization (%)		
		3174 3R/53R	3174 Gateway	Ring
1/1	6.7	.95	.20	
1/32	214	30	6.5	
10/320	2140		65	15–17

The first line in the table shows that the utilization of the 3174 Gateway is .2 percent when a single terminal attached to a control unit is transacting 6.7 type A-1200 transactions per minute (TPM). The next line shows the increase of the 3174 Gateway when the number of terminals on a single 3174 model 53R control unit is increased to 32, each processing 6.7 transactions per minute. In the bottom line the number of terminals and control units have been increased to 320 and 10 respectively (to 20 in the case of the model 53R), again, with a transaction load of 6.7 TPM per terminal.

According to this information, the 3174 Gateway can handle a maximum of 35 to 40 transactions per second (TPS) resulting in a control unit utilization of 65 to 70 percent. With this traffic, the Token-Ring Network utilization is in the range of 15 to 17 percent. When the aggregate transaction demand from devices attached to 3174 subsystems with a token-ring starts to exceed the thresholds presented in this document, operations will continue without loss of data but response times will increase, and data transfer rates will drop.

The cited performance characteristics were obtained by customizing for the maximum I-frame size on the Token-Ring Network, that is, 2042 bytes, and the maximum window size of 2. See configuration question 941. Using a smaller frame-size for large messages substantially increases utilization of the 3174 Gateway for a given amount of data to be transported, because overhead processing increases. As a result, traffic-handling capacity of the 3270 gateway may be reduced by as much as fifty percent, depending on the application.

For models 3R and 53R, furthermore, the answers to configuration questions 380, 381, 382, and 383 were assumed to be "2042", "1", "2042", and "2", respectively.

On the SNA level, one acknowledgement message has been assumed to follow the "write" operations in both type A-1200 benchmarks and file transfers. While a SNA acknowledgement message does not add much to response time, it does significantly increase 3270 gateway utilization, thereby decreasing the maximum amount of traffic that the 3270 gateway can handle.

5.3.5.2 File Transfer Considerations

An aggregate rate of concurrent file transfers of 60 Kbytes/second would produce 65 percent utilization in the 3174 Gateway, which is the recommended maximum. Please consider that file transfer and interactive transactions have to share the resources of the 3174 gateway. For example, when you want to allow for a combined average file transfer rate of 20 kbytes per second, do not plan for more than 24 type A-1200 transactions through the Gateway. (The actual rate associated with a given file transfer depends on many factors such as workstation type and host support).

5.3.5.3 3174 DSPU VS Channel-Attached 3274

Preliminary analysis indicates that it may be possible to migrate from channel-attached 3274 control units to the new Token-Ring attached 3174 control units and realize an improvement in performance. For short data stream applications, such as alphanumerics, user response times across the Token-Ring Network can be less than those for direct channel attachment via the current 3274 control units.

Major reasons for the performance improvement include a faster processor and channel adapter in the 3174-01L, improvements in microcode, and the ability of the Token-Ring Network to support data transfer rates in the megabit-per-second range.

In sample analysis, user response times were compared for a simple interactive workload (40-bytes in and 1400-bytes out) on two system configurations. The first configuration consisted of 3278 displays directly attached to 3274 controllers on a S/370 channel. The second configuration had the 3278 displays on 3174 controllers located within a building complex on the Token-Ring Network. The Token-Ring Network, in turn, is connected to a 3174 controller on a S/370 channel.

The subsystem response times (excluding the S/370 response time) for the Token-Ring configuration were 40-80 percent of response times for the channel-attached 3274's. The smaller percentage occurred at higher terminal transaction rates where the greater throughput capacity of the 3174 was an advantage.

For terminals emulating the 3278, the internal delays of the terminals may be large compared to the subsystem response times, so the improvement may not be noticeable to the user.

These preliminary performance analyses were obtained from simulation models using simple, homogeneous workloads. Performance for a particular customer's workload and environment may be different.

5.3.6 Prerequisites for the 3174 Gateway

At least one Storage Expansion Feature (#1011 or #1012) is required. The amount of storage expansion required is determined by the number of DSPUs defined in the 3174 Gateway customization. PUs attached to the Token-Ring communicating only with other Token-Ring devices should not be considered. In case there is not enough storage for the amount of PUs given service, the 3174-01L will not finish the IML procedure normally. Non-Token-Ring 3174 controller functions do not use this memory expansion.

Storage Requirements:

```
up to   28 DSPUs   1 x #1011   (Minimum)       (  512K)
up to   72 DSPUs   1 x #1012                   ( 1024K)
up to  116 DSPUs   1 x #1011 + 1 x #1012       ( 1536K)
up to  140 DSPUs   2 x #1012   (Maximum)       ( 2048K)
```

Each DSPU session requires approximately 11k of storage. Due to limitation of 3174 slots and usefulness of the 1 M storage option; it is recommended that you install only the 1 M cards; #1012.

5.3.7 Host System Support

The 3270 Token-Ring Gateway is supported by following Programs and Versions:

- ACF/VTAM under VM, MVS and VSE

For most versions of VTAM, APAR fixes are required. Please refer to the appendix of this manual for the list of VTAM APARs available at the time of publication of this document.

VTAM Version 2 Release 1 and later releases are supported.

- NPDA in NetView, Version 1.

- Application Programs supporting 3274-41A with C.S. "D" Rel. 65 need not be altered, unless they interpret certain SNA sense information, see 3174 Functional Description, (GA23-0218) "Host Programming Considerations", Appendix B.

5.3.8   Systems Definitions

5.3.8.1   VM/SP

The following examples are valid VM definitions for the 3174-01L acting as a Token-Ring Gateway and for the ring-attached downstream PUs. These definitions can be used if the Gateway is attached to a virtual guest machine (e.g. VSE/VCNA) or if the Gateway is attached to the so called "native" VTAM directly under VM.

For the Gateway:

```
RDEVICE ADDRESS = E40,DEVTYPE = 3705,ADAPTER = TYPE4,MODEL = H8,      *
    CPTYPE = NCP
```

For the DSPUs:

```
RDEVICE ADDRESS = E41,DEVTYPE = 3705,ADAPTER = TYPE4,MODEL = H8,      *
    CPTYPE = NCP
RDEVICE ADDRESS = E42,DEVTYPE = 3705,ADAPTER = TYPE4,MODEL = H8,      *
    CPTYPE = NCP
RDEVICE ADDRESS = E43,DEVTYPE = 3705,ADAPTER = TYPE4,MODEL = H8,      *
    CPTYPE = NCP
RDEVICE ADDRESS = E44,DEVTYPE = 3705,ADAPTER = TYPE4,MODEL = H8,      *
    CPTYPE = NCP
RDEVICE ADDRESS = E45,DEVTYPE = 3705,ADAPTER = TYPE4,MODEL = H8,      *
    CPTYPE = NCP
```

For the Gateway:

```
RCTLUNIT ADDRESS = E40,CUTYPE = 3705,FEATURE = 16-DEVICE

RCHANNEL ADDRESS = E,CHTYPE = BLKMPXR
```

The FEATURE parameter of the RCTLUNIT macro specifies the maximum number of Token-Ring attached cluster control units or workstations supported by a single 3174-01L with the 3270 Gateway feature installed. The value given in the FEATURE parameter must be a multiple of 8. For the maximum number of workstations or controllers supported by the Gateway feature (140), the parameter must be coded FEATURE = 144-DEVICE.

The value given in the ADDRESS parameter of the RCTLUNIT macro must end with a "0".

A RDEVICE macro must be coded for the Gateway itself and for each Token-Ring attached cluster controller or workstation (PU).

If there are more DSPUs definitions in the 3174 Gateway than VM RDEVICE macros definitions, the attempt to bring up the Gateway will lead to a VTAM hang-up situation.

5.3.8.2 MVS/SP

An IODEVICE macro must be coded for the 3174-01L gateway and for each Token-Ring attached node.

The UNIT parameter of the IODEVICE macro must be coded "3791L".

The ADDRESS parameter of the IODEVICE macro allows specification of multiple Token-Ring attached devices.

A single IODEVICE macro should be coded, with the ADDRESS parameter specifying multiple devices. (Note that XA systems require IOCP generation and use the IODEVICE and CTLUNIT macros.)

5.3.8.3 VSE

VSE/SP2.1 will not automatically recognize and generate ADD statements for locally attached 3174-01Ls. The user must manually include ADD statements, as in the following example:

For the Gateway:

> ADD E40,3791L,EML

For the DSPUs:

> ADD E41,3791L,EML
> ADD E42,3791L,EML
> ADD E43,3791L,EML
> ADD E44,3791L,EML
> ADD E45,3791L,EML

The emulation parameter (EML) is necessary to inform VSE/SP2.1 that the 3174-01L is to be handled as a 3274-A41.

5.3.8.4 VTAM

If (n) Token-Ring nodes are supported through a single 3174 Gateway, (n + 1) VTAM PU macros must be coded for local, channel-attached SNA controllers. A sub-channel address must be defined for the Gateway and each Token-Ring attached cluster controller or workstation. The sub-channel address assigned to the Gateway must be the lowest address in the ring, and all sub-channel addresses must be contiguous.

In VTAM Version 3.1.1, the SECNET parameter of the PU macro must be set to "YES" for all DSPUs but not for the gateway itself.

The size of the host buffers multiplied by the number of host buffers must be large enough to accommodate:

*   The Link Header (min. 4 Bytes, max. 32 Bytes) (LH)

*   The Transmission Header (TH)

*   The Request Header (RH)

*   A minimum of 256 bytes of user data (RU)

The size of the host buffers is defined in the ACF/VTAM start options:

> MVS: The buffsize value of the IOBUF buffer pool
> VSE: The buffsize value of the LFBUF buffer pool

The number of host buffers is defined in the MAXBFRU parameter of the PU macro for the local SNA minor node.

5.3.8.5 Channel Type VS UCW Definition

For a 3174 Gateway Unit Control Words (UCWs) must be set up according to the channel type:

Channel Type	UCW Type	
	Gateway	3174 SNA
370 Byte MPX 370 Block MPX 370 XA Byte MPX 370 XA Block MPX	shared shared non-shared shared	non-shared non-shared non-shared non-shared

5.3.9 Customization

If the 3270 Token-Ring Gateway feature is installed on a controller already used as a non-SNA or as an SNA channel-attached controller, a new customization must be performed with Configuration Support "S". In case the controller was used as a non-SNA controller, the host system definitions must be done again. Remember that the gateway customization can be done in any model of the 3174 controller. (At IML time, the 3174 will determine whether there is any incompatibility between the hardware and the microcode.)

Only those customization questions dealing with the Token-Ring Gateway Feature are discussed in this chapter. See the appendix for a 3174 customization example.

5.3.9.1 Question 100: Model Designation

The 3174 model "01L" is the only model for the gateway functions in Configuration Support-S Release 1.0

5.3.9.2 Question 101: Host Attachment

The Microcode Release for the 3270 Gateway Feature (S1.0) accepts "5" (local SNA) as the only valid response. All other responses are denied.

5.3.9.3 Question 104: Control Unit Address

Response: The two-digit control unit address of the gateway.

The host system recognizes this as the control unit address assigned to represent the I/O address of the 3174 Gateway as an SNA Physical Unit. For example, enter "40" if the CUADDR parameter of the VTAM PU macro for the gateway has been coded "E40" ("E" being the channel address).

5.3.9.4 Question 105: Upper Limit Address

This question is new in the "Local (SNA)" customization panel. Question 104, the lowest actual sub-channel address and question 105, the upper sub-channel address, provide the range of sub-channels used by the gateway feature. This range defines the number of DSPUs being configured. The sub-channel range is checked to ensure that it does not exceed the maximum number of DSPUs supported by the feature (plus one for the gateway itself), the response to question 105 minus the response to question 104 therefore cannot be greater than 140 (X'8C').

If you do not want to define DSPUs attached to the Token-Ring, your response to question 105 must be "00" or must be equal to the response to question 104. This prevents the Token-Ring customization panels from being presented.

5.3.9.5 Question 121: Keyboard Language and I/O Interface Code

The response is a two-digit code representing the keyboard language and the I/O interface code that will be used in this cluster.

The 3174 Customizing Guide (GA23-0214) contains two tables to help you select the two-digit code. Use the first one if you have Release 1 of the 3174 microcode or the 3270 Token-Ring Gateway Feature; use the second one if you have Release 2 of the 3174 microcode.

5.3.9.6 Question 223: Attention Delay Value (SNA)

Attention delay is not implemented for the Token-Ring Network 3270 Gateway feature. Therefore, any response entered here will be ignored by the gateway microcode.

5.3.9.7 Question 900: Token-Ring Network Address for the Gateway

The response must contain 12 hexadecimal digits; it cannot be all zeroes. The format is:

      4000 annn nnnn

where:

    '4000' is the fixed part of the address
    'a' must not be greater than X'7' (X'8' being a functional address.)
    'n' can be 0-F hexadecimal.

See "Naming Conventions for Adapter Addresses" in Introduction to the IBM Token-Ring Environment.

5.3.9.8 Question 905: Ring Error Monitor (REM)

The response must be '1' (REM active) or '0' (REM inactive). Default is '1'.

5.3.9.9 Question 908: Link Subsystem Name

The response must be 6 alphanumeric non-blank characters. The default value is "IBMLAN".

This name should be unique for each gateway controller and it should follow certain conventions because it is inserted into each Alert-RU travelling upstream to the host.

5.3.9.10 Question 940: Ring Address Assignment

This question comes up in the form of a panel with four columns in the left half of the figure and the same four columns repeated in the right half. Each half-line relates the host sub-channel addresses to the gateway or to downstream PU addresses, providing in this way the logical mapping between both. The panel displays as many entries as devices were specified in the questions 104 and 105.

- Column 1 (S@)

    The sub-channel addresses are provided automatically in this column. They are derived from the range of sub-channels entered in questions 104 and 105. If the number of DSPUs is greater than the number of half-lines fitting on one panel, additional panels will be presented.

- Column 2 (Ring@)

In this column, the 12-digit Token-Ring addresses of the DSPUs must be entered.

See "Naming Conventions for Adapter Addresses" in the Introduction to the IBM Token-Ring Environment for the format.

The combination of the ring address and the SAP-ID entered in the next column must be unique.

The adapter address of the gateway is provided automatically from the response to question 900 and is assigned to the lowest sub-channel address.

The sub-channel addresses, the Token-Ring address of the gateway and the SAP address of the gateway are protected and cannot be altered by the user.

If channel addresses are not used, they cannot be used for other devices in the same channel.

- Column 3 (SAP@)

  This column defines the service access point (SAP) ID. Some attaching products may appear as multiple SNA physical units and therefore have multiple SAP addresses and a single Ring address. Refer to the installation manuals for the products you wish to attach for more information.

  If the ring addresses are different, the SAP-IDs may be equal for the Gateway and all DSPUs.

  If the downstream PU to be defined here is a 3174-03R/53R, the SAP ID has to be '04', because this is the value used for a SNA connection over the Token-Ring (it is hard-coded within the 3174 microcode). One link connection is maintained over this SAP. The SAP ID of the 3174-01L Gateway itself is also hard-coded as '04', and is forced during the customization.

  Response: Two hexadecimal characters. The default is 04. This must be a multiple of 4 in the range of X'04' - X'EC'.

- Column 4 (T)

  This column specifies the type of the DSPU. The response should be '0' for a PC-like Workstation, or '1' for a 3174 control unit and for a System /36.

  The default is '0'. The answer to this question will determine the default values for I-frame size and maximum out (transmit window size) on the "Ring Transmission Definition" panel.

5.3.9.11 Question 941: Ring Transmission Definition

The Ring Transmission Definition panel presents the default values for the Token-Ring maximum I-frame size (F-field) and the window size (W-field) based on the type entered by the user on the Ring Address Assignment panel. The user has the option at this point to change these values or to accept the defaults. If he wants to accept the defaults for all of the DSPUs, he should press the PF key for FWD and continue the configuration process. The current implementation for the default values is as follows:

Downstream PU	Maximum I-frame size	Maximum window size
Workstation (T=0)	entry 0 (265 value)	1
Controller (T=1)	entry 3 (2042 value)	2

Valid entries for maximum I-frame size are:

<div style="text-align:center">

0 for 265 bytes
1 for 521 bytes

</div>

2 for 1033 bytes
3 for 2042 bytes

It should be noted that the values for maximum I-frame include the additional bytes for the SNA header.

The maximum out window size is the number of I-frames the 3174 gateway transmits before waiting to receive an acknowledgment. The valid maximum window size is based on the user's entry for F-field. Current implementation of this algorithm yields the following:

I—FRAME SIZE ENTERED	MAX WINDOW SIZE
265 bytes	7
521 bytes	7
1033 bytes	4
2042 bytes	2

The sub-channel addresses (along with their corresponding ring addresses and their SAP-IDs) also appear on this screen, but are protected; the user cannot change them.

I-Frame Size and Window Size Considerations: This section defines the interrelationship between the I-frame size (F-field) and the Window size (W-field) of the 3174 Gateway with question 380 (Max. receive I-frame size) and question 381 (Receive window size) of the 3174 DSPU.

Accepting the default values given by the 3174 customizing procedure for the gateway and the DSPU will give an operative environment. However, the following points should be taken into consideration to improve the performance of the Token-Ring Network and the total response time of the system.

The I-frame size of the 3174 Gateway and the Token-Ring attached workstation must be the same, If it is a 3174 DSPU, the response to the F-field should match the responses to question 380 during customization.

The W-field defines the number of frames that the 3174 Gateway will send to the downstream node before suspending transmission to await acknowledgement. Question 381 defines the number of frames that the 3174 DSPU will receive before it sends a supervisory frame to acknowledge receipt of the frames (if inbound data is being sent to the host, this Token-Ring acknowledgement would be piggybacked on the data).

It appears that the supervisory frame sent by the 3174 DSPU adds very little to Token-Ring congestion. Therefore, it may often be advisable to set question 381 to 1 because this ensures that the frame is acknowledged and there is very little chance that the sender (the 3174 Token-Ring Gateway, for instance) will need to suspend to await this acknowledgement. If Token-Ring congestion is a concern of the user, a value greater than 1 could be specified in question 381.

In most cases, performance can be improved by making the W-field value greater than the value in question 381. This will allow the 3174 Gateway to continue transmission while the 3174 DSPU is processing the data it received already and is sending the response back to the 3174 Gateway. If they are equal, then the 3174 Gateway will probably suspend when it has transmitted the number of frames designated by W-field. Since the acknowledgement is not ready to be sent until the 3174 DSPU has received the data, there is a delay in sending the acknowledgement, and thus the 3174 Gateway will suspend.

The W-field value should never be set less than value in question 381 because this will definitely cause suspension of transmission while waiting for acknowledgement, and thus degrade performance.

If the path from the 3174 Gateway to the 3174 DSPU contains Token-Ring bridges, there may be justification for making the difference between the W-field and 381 value greater than 1. This is because of the delay introduced by copying data from one ring to another by the Token-Ring Bridge.

In addition, one must remember when specifying W-field values, that the buffers are retained by the Gateway until the data in the buffers are acknowledged. If W-field is significantly large, then the Gateway could deplete its buffer resources frequently and thus decrease performance.

If the value in question 381 is set to 1, then the best value for W-field is 2 or 3 if no bridges are used and slightly larger if bridges are used. This should prevent suspension of transmission, but shouldn't cause continual depletion of buffer resources.

5.4   3174 DSPU: Models 03R and 53R

Two models of the 3174 (03R and 53R) are used as DSPUs. These new Models of the 3174 control unit attach to the IBM Token-Ring Network and communicate with a host through a gateway. 3174 DSPUs can connect up to 32 or 16 workstations. For workstations in DFT mode with multiple logical units these control units support up to 128 or 76 LUs.

The Gateway which the 3174 DSPU is going to use is defined at 3174 customization time, if this DSPU has to communicate with a Gateway which has a different Token-Ring address, it must be re-IMLed with a Control diskette customized for this Gateway address.

Unlike the PCs attached to the ring, devices attached to these 3174 models are not able to communicate directly with other devices in the ring.

3174 DSPUs communicate only with the host using either the 3174 or the 3725/20 Gateway. Host definitions for the 3174 DSPU are different, depending on gateway type.

5.4.1   Hardware Installation

3174 models with the upstream Token-Ring adapter card are:

> 3174-03R having up to 32 ports and managing up to 128 LUs.
> 3174-53R having up to 16 ports and managing up to 76 LUs.

Functionally, both models are identical. You can also change existing 3174-01R (V.24 Interface) or 3174-02R (X.21 Interface) models to 3174-03R models simply by installing the Token-Ring adapter card (and, eventually, a new microcode level). The available 3174-03R conversion package includes the following:

* Token-Ring Adapter

* Control and Utility/Diagnostics diskettes

* Adapter cable

No additional storage expansion is needed for this conversion. The microcode will determine which adapter of the 3174 is working., The Token-Ring adapter card must be installed in slot 11 of the 3174-3R control unit. For more information on the position of the different cards in the 3174 please refer to the 3174 Large Control Unit Plug Chart in the appendix of this book.

5.4.2   Microcode

The microcode includes a Utility/Diagnostic diskette and a Configuration Support Control diskette with the microcode needed to handle the IBM Token-Ring Network connection. This microcode is implemented in Release 2 of the standard 3174 microcode and therefore supports all standard functions of the 3174 at this level.

The current microcode level is: A2.0   ML 87037

5.4.3   Prerequisites

There are no memory prerequisite for these models.

Since these downstream PUs communicate with the host through gateways, they appear to the host access methods and applications like a PU type 2.0 (currently supported). Certain sense information generated by these PUs is different from that generated by the former 3274 controllers', see "3174 Functional Description" (GA23-0218) "Host Programming Considerations", Appendix B.

5.4.4 Customization

Before your 3174-03R/53R can be used as a downstream cluster controller, it has to be properly customized. Only those customization questions dealing with the Token-Ring Network attachment are discussed in this chapter. (See the appendix for a customization example.)

The response to some customization questions depends upon whether the control unit is attached locally or remotely. A Token-Ring attached control unit is in fact installed remotely, but for purposes of answering the customization questions it should be considered as locally attached.

Take this into consideration if (for example) you have to decide whether data should be compressed. The recommendation is that locally attached devices should transmit non-compressed data because of the high channel speed and remotely attached devices should compress data to be transmitted because of the lower line speed.

5.4.4.1 Question 100: Model Designation

Models valid for this type of controller are 03R and 53R.

5.4.4.2 Question 101: Host Attachment

Depending on the response to this question, the next customization panel displayed will relate to the environment chosen. If your response is '7', the next panel presented is the Token-Ring Network Panel.

5.4.4.3 Question 106: Token-Ring Network Address of the 3174 (DSPU)

The response must contain 12 hexadecimal digits for the Token-Ring address of the 3174-03R/53R you are currently customizing.

The address can be either a locally administered address or a universal address. See "Naming Conventions for Adapter Addresses" for the format and "Getting the universal adapter address" in the appendix of this book.

NOTES

1. If the gateway that you are using is a 372X please refer to "Planning for 3174 DSPU - 372X Gateway" section later on in this chapter for detailed information.

2. The response to this question cannot be all zeros, nor can it be the same as the response to question 107.

3. If the gateway is the 3174-01L, it is recommended that the Locally Administered Address scheme be used.

5.4.4.4 Question 107: Token-Ring Network Address of the Gateway

The response must contain 12 hexadecimal digits for the Token-Ring address of the 3174-01L or the 3720/25 (whichever serves as a gateway for the DSPU you are currently customizing).

The address can be either a locally administered address or a universal address. See "Naming Conventions for Adapter Addresses" for the format and "Getting the universal adapter address" in the appendix of this book.

NOTES

1. If the gateway that you are using is a 372X please refer to "Planning for 3174 DSPU - 372X Gateway" section later on in this chapter for detailed information.

2. The response to this question cannot be all zeros, nor can it be the same as the response to question 107.

3. If the gateway is the 3174-01L, it is recommended that the Locally Administered Address scheme be used.

5.4.4.5 Question 121: Keyboard Language and Character

The response is a two-digit code representing the keyboard language and the I/O interface code that will be used in this cluster.

The user should consider the environment (and not only the controller) when making choices based on remote/local dependent questions. The limitations of the user's selection of ASCII languages based on the model of the controller do not apply for the Token-Ring upstream attachment. See 3174 Subsystem Control Unit Customizing Guide, (GA23-0214).

5.4.4.6 Question 215: Physical Unit Identification

The Physical Unit Identification (PUID) consists of five hexadecimal digits in the range 0 through F hexadecimal. The default value is '00000'. Each PUID in the network should be unique because it identifies the control unit to the host in response to an XID command. The PUID is mandatory if the 3174 DSPU will use a 3720 or 3725 Gateway.

The PUID has no significance if the gateway is a 3174-01L. There is no IDNUM parameter in the PU statement of a local SNA node. However, we recommend supplying a unique value, since sometimes the type of gateway may change (e.g. for backup reasons).

5.4.4.7 Question 380: Max. Receive I-Frame Size

The response consists of four numerical characters padded (if necessary) with leading zeros. For range of values see the discussion of customization question 941 for the 3174 Gateway. The default value is '2042', because this is the maximum value the 3174 DSPU can handle.

NOTES

1. The response to this question is dependent upon your gateway and ring configuration.

2. If your gateway is a 3174-01L, the response to this question should match the F-field value given in panel 941.

3. The I-Frame size should include the length for the SNA transmission header and the request header (TH = 6 bytes, RH = 3 bytes).

4. Valid responses range from 265 to 2042 bytes.

5.4.4.8 Question 381: Token-Ring Network Maximum In

The response must be a number in the range 1 to 7. The default value is 2; this value defines the Receive Window Size for the DSPU.

NOTES

1. The response to this question is dependent upon your gateway and ring configuration. The value given here specifies the maximum number of link level I-Frames that the 3174 DSPU will receive before it transmits an acknowledgement.

2. If your gateway is a 3174-01L, the response to this question should be equal to or less than the W-field response for question 941 during the customization of the gateway. (see the discussion of the W-field value at 3174 Gateway customization, question 941).

5.4.4.9 Question 382: Max. Transmission I-Frame Size

The response consists of four numerical characters (padded if necessary with leading zeros). The default value is '0521'.

NOTES

1. The response to this question is dependent upon your gateway and ring configuration.

2. The I-Frame size should include the length for the SNA transmission header and the request header (TH = 6 bytes, RH = 3 bytes).

3. Valid responses range from 265 to 2042 bytes.

5.4.4.10   Question 383:   Token-Ring Network Maximum Out

The response must be a number from 1 to 7. The default value is 2. This value defines the Transmit Window Size for the DSPU.

NOTES

1. The response to this question is dependent upon your gateway and the ring configuration. The value given here specifies the maximum number of link level I-Frames that the 3174 DSPU will transmit before it waits for an acknowledgement.

2. The following figure specifies valid responses based on the associated I-Frame size given in the response to question 382.

I-Frame size entered as response to # 382	Token-Ring Network Maximum Out
265 <= X <= 521 bytes	7
522 <= X <= 1033 bytes	7
1034 <= X <= 2042 bytes	4

5.5   Planning for 3174 DSPUs - 372X Gateway

The 3174 DSPU communicating with the host via a 3720 or 3725 communication controller must be defined to VTAM in a Switched SNA Major Node and to NCP as a PU-T2.0 attached to a switched SDLC link (the TIC must be defined to NCP as a PU-T1 attached to a leased line). The IDBLK-Number carried in the inbound XID command is '017' (as it is for a 3174/3274 attached to a real switched line).

A 3725 can support 2,440 DSPUs; a 3720, 522. If a DSPU must communicate through a second gateway (a second TIC, or another 3720/25) with a different Token-Ring address, it must be re-IMLed with the control diskette customized for the second gateway address.

The gateways used for the tests were a 3725 channel-attached to the host with two different TICs attached to two different rings and, in another case, a remote 3720 connected via an INN link to a local channel-attached 3720.

5.5.1 372X as a Token-Ring Gateway

The current NCP version will deny definitions of two TICs with the same Token-Ring Address at generation time. For this reason, the backup TIC has to be in another 3720/25 (another NCP).

For 'dial in', the same SNA switched major node can be used, because only the PUID (IDBLK/IDNUM) is tested for verification of the incoming call. For 'dial out', if one application acquires a LU, a new node must be activated because the path to the LU is now through another subarea.

If the owning host fails and there is a backup host, the ownership of the TIC-PU can be taken over for error recovery nondisruptively. This is because the TIC is defined like a leased line; the DSPUs are defined as if they were attached to switched lines, and no switched line takeover is supported. The result is that existing sessions from the DSPUs still work, but no new sessions can be established.

5.5.2 Installation Planning

Information presented in this section is a quick cross reference and check list of 3174 Token-Ring customizing questions for use with a 3174 on a 327X Gateway. In general the following discussions are brief and limited to only basic information.

5.5.2.1 Differences Between the 3174 DSPU and a PC

The two major differences between a PC with IBM PC 3270 Emulation Program Version 3 and a 3174 DSPU using a 327X host gateway are:

1. The 3174 normally have more than 2 LUs defined. Adjust your LUDRPOOL parameters accordingly. Likewise having several LUs per PU impacts the MAXLU value on the logical lines PU statement.

2. The 3174 allows receiving and transmission of larger Token-Ring frames. The PC is limited to 265 characters; the 3174 will support up to 2042 characters. This impacts your coding of MAXOUT parameters in the switch major nodes PU, your specification of frame sizes received, RCVBUFC=, and frames transmitted by the Token-Ring Interface Coupler (TIC), MAXTSL=.

5.5.2.2 Switch Major Node Skeleton (VTAM)

```
         VBUILD TYPE=SWNET
         MAXGRP=n,MAXNO=n  needed for PATH statements
*
PU3174   PU   ...,           Each 3174 model 53R or 3R is a PU
              ADDR=01,       3174 meaningless
              PUTYPE=2,      3174 is a PU type 2
              IDBLK=017,     3174 XID uses IDBLK of '017'
              IDNUM=xxxxx,   Matches 3174 question 215
              MAXOUT=x,      3174 question 381;
              MAXDATA=xxx,   3174 question 380;
              MAXPATH=x,     Required if using PATH statement.
              ...
PTH3174  PATH DIALNO=tt044000xxxxxxxx, 3174 question 106
*
LU1      LU   LOCADDR=2,     3174 question 116, 117, 118
LU2      LU   LOCADDR=3,     3174 question 116, 117, 118
LU3      LU   LOCADDR=4,     3174 question 116, 117, 118
              :
PUPC     PU   ....
```

5.5.2.3 NTRI Definitions for NCP

```
          BUILD...
PGROUP    GROUP  ECLTYPE=PHYSICAL, ...
          LINE   RCVBUFC=xxxx,           question 382
                 LOCADDR=40xxxxxxxxxx,   question 107
                 MAXTSL=xxxx,            question 380
LGROUP1   GROUP  ECLTYPE=LOGICAL,        Used for call in by 3174 3/53R
                 MAXLU=xx,               3174 questions 116 and 117
```

5.5.2.4 3174 DSPU Definitions

- Question 106: Token-Ring Network Address of the 3174

  This question supplies the 3174 DSPU Token-Ring address. The Switched Major Node PATH DIALNO value corresponds to this question. The DIALNO parameter is coded in the format:

  <div align="center">tt 04 4000XYYYYYYY</div>

  Where:

  > tt: is the TICs PORTADD of its Physical Line
  > 04: is the 3174 Service Access Point (SAP)
  > 4000XYYYYYYY: is 3174s question 106 value

  The PATH DIALNO parameter is not required when you have the 3174 do the connection. That is if you have coded

  ```
  GROUP ECLTYPE=LOGICAL,CALL=IN,PHYPORT=NONE ... rather than
  GROUP ECLTYPE=LOGICAL,CALL=OUT,PHYPORT=n ...      or
  GROUP ECLTYPE=LOGICAL,CALL=INOUT,PHYPORT=n ...
  ```

  But even when this is the case, you must provide a locally administered address for the 3174. Although your address is no longer limited to decimal digits, as discussed above, it is recommended that the decimal address convention be retained for possible use of NCP connections in the future.

- Question 107: Token-Ring Network Address of the Gateway

  This answer must match the Token-Ring address of the 3725s GROUP ECLTYPE = PHYSICAL; LINE ; LOCADD = parameter.

- Question 215: Physical Unit Identification (PUID)

  This parameter is what identifies the 3174 when the logical switched connection is made. It will be matched in VTAM to the proper PU definition in the switch major node. This parameter thus must be unique for every 3270 Type Control Unit. In our case this require unique PUIDs for each 3174 DSPU and any PC using PC 3270 emulation program V3.

  The PU IDNUM = parameter in VTAMs switch major node corresponds to question 215 response. Note that a 3174 also requires IDBLK = 017 to be specified for the PU. For a description of the XID command that 215 creates see the 3174 Functional Description, GA23-0218, discussion of REMOTE SNA controllers (Chapter 6). See the information on the 3174 PUID as well as a description of the 3174 XID command handling.

Planning recommendations: Traditionally this value is set equal to the last five digits of the 3174 serial number. A better option if mixing PC and 3174s on the same token-ring is to have the PUID reflect a unique part of the token-ring address from question 106.

- Question 380: Maximum Receive I-frame Size

Question 380 sets the size of the 3174 buffers used for receiving Token-Ring frames sent from the 372x TIC. The 3174 customizing procedure allows answers with values between 0265 and 2042; the default value for the question is 2042. To prevent rejection of frames sent from the TIC, the buffers resulting from 380 answer must be equal to or larger than the size of the frames sent. The Switch Major Node PU MAXDATA parameter sets the maximum frame size sent to the 3174. Thus you need to set 380s reponse to be equal to or larger than MAXDATA.

Both question 380 and MAXDATA values are based on the same calculations. Both values include the 9 bytes of the transmission header (TH) and response header (RH).

The default MAXDATA value for a PU type 2 (like a 3174) is 265. The NCP places some restrictions on MAXDATA. MAXDATA must be equal to or less than MAXTSL, the 3725s maximum Token-Ring transmit length. MAXTSL may range from 265 to 1108; 265 is the default. Thus 380 practical range becomes 0265 to 1108.

Actual buffer sizes allocated within the 3174 are:

Response to 380	3174 Buffer allocated
0265 to 0521	521
0522 to 1033	1033
1034 to 2042	2042

NOTE: The 2042 byte restriction is a limitation of the Token-Ring; a true 2K buffer would result in a 2057 byte frame size.

In summary:

1. MAXTSL should be set at its maximum value of 1108, providing future growth of MAXDATA values.

2. MAXDATA can range from a minimum of 265 to MAXTSL

3. Question 380 should be set equal to or greater than MAXDATA.

4. To match the 3174 buffers consider the use of the true buffer values such as 0512 or 1033 bytes.

Planning recommendations: Set MAXTSL to 1108, MAXDATA to 1108 (or 1033) and 3174 Question 380 to default (2042).

- Question 381: Token-Ring Network Maximum In (MAXIN)

MAXIN is defined as the number of I-frames the 3174 will receive before it is required to send a frame to acknowledge the receipt of these I-frames. Since a 3174 inbound I-frame to the NCP includes an acknowledgement, this MAXIN value determines when the 3174 must send a separate supervisory frame for I-frame acknowledgement.

The PU MAXOUT value is defined as the number of frames that the NCP will send before it waits for an acknowledgement on either a standalone supervisory frame or piggybacked on inbound data.

Question 381 sets the 3174 MAXIN value. 381 must be set equal to (or less than) the MAXOUT value of the PU definition in the switched major node. The recommended MAXOUT value is 7. Yet a value smaller than the MAXOUT value is normally desirable for 381 value. These cases include Token-Rings that may require frequent frame recovery and/or when frames must transfers bridges.

Planning Recommendations: Use the default MAXOUT of 7, and the defalut of 381 of 1. These options result in not only values that will always work but will also produce the best results on what would normally be problem conditions, rings with multiple bridges and/or high error rates.

- Question 382: Maximum Transmission I-Frame Size

382 supplies the buffers for frames sent from the 3174 to to NCP. NCPs RCVBUFC must be large enough to handle the largest frame sent by the 3174. RCVBUFCs default value is 1122 bytes, with a maximum of size of 4095. Minimum is 6 times NCP buffer size. RCVBUFCs buffer size includes much more that the TH + RH + RU of questions 382 value. For example: Token Ring headers (14 bytes), routing information when using Bridges (18 bytes), the data link header (4 bytes). A good rule is for (RCVBUFC value - 41) to be larger than or equal to the value in 3174 question 382 value.

Buffers sizes allocated within the 3174 are the same as questions 380 comments.

Recommendations: For future growth it is recommended that RCVBUFC be set to its maximum of 4095. For first time usage set question 382 to 1033 or less, since these smaller values should always work no matter the size of RCVBUFC. These values will also allow setting question 382 to its maximum value of 7, which is desirable. For ease of use consider the 3174 default of 521. But if the 3174 has DFT devices using file transfers consider consider increasing the value to 1033. (DFT RU sizes are 1024 thus this lets the frame size match the RU.)

- Question 383: Token-Ring Net Max Out

This is similar to question 381, but in this case the 3174 is the sender and the NCP is the receiver. Presently the 3725 will send an acknowledgement after each receipt of the token frame.

Planning Recommendations: We recommend you set 383 to the maximum allowed for your response to 382. These maximums are:

```
question 382 value        383 maximum (recommended) value

     265 to 1033                   7
    1034 or larger                 4
```

But with no more than one bridge used on the Token-Ring 383 default of one is acceptable. If several bridges are crossed during transmission consider changing the value.

5.6 Installed Equipment for Tests

This section presents the configuration installed in the Raleigh International Technical Support Center to test different backup/recovery scenarios and file transfer from a 3270 PC to different operating systems through different gateways.

3174 and 3725 Gateways were channel-attached to different subareas; one under VM/VTAM and the other under MVS, both virtual machines, were linked via a virtual channel-to-channel connection. The 3720 Gateway was line-attached to another 3720 which was in turn channel-attached to the same MVS system.

Different downstream PUs (like the 3174-03R, System/36 and PCs using 3270 emulation or APPC/PC) were set up to test them with all the Gateways, to different operating systems, and applications.

Two different Token-Rings linked via a Bridge were installed to test backup/recovery scenarios when the gateways were located in the same or different ring of the DSPUs. The 3725 was attached to both rings with to different TICs.
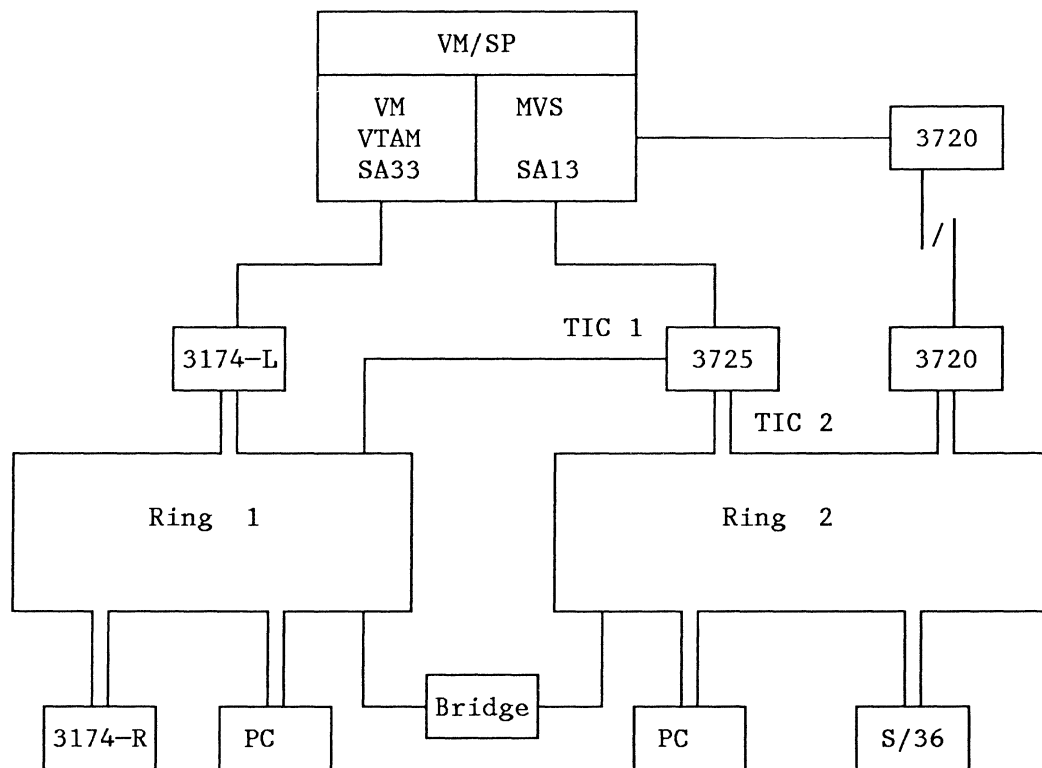
5.7 Planning for Backup/Recovery with the 3174 Gateway

The 3174 Gateway offers powerful backup/recovery possibilities. Personnel responsible for network planning and installation should consider the information presented here and tailor it to their own environments.

Different scenarios are offered as suggestions for Gateway backup and Token-Ring Network recovery. The number of 3174 Gateways, ring addresses of the Gateways and number of host are some of the different factors taken in consideration. A scenario with mixed type of Gateways is also presented.

Network topology can be accommodated to fit any of these environments. As this book deals with the 3174, the reader will not find information regarding Token-Ring topologies or Token-Ring Network design; other manuals should be consulted for this purpose.

5.7.1 Backup Planning

The following points should be taken in consideration for backup planning:

* Number of gateways

   The number of transactions per second that will flow through the gateway will determine the number of gateways needed. The user should use different tools (SNAP/SHOT, FIVE3270, 3X74 Performance Guidelines manual, etc) to determine the load the gateway is going to handle.

   Each gateway should have its own backup controller ready to restart the traffic in case the main gateway fails.

* Number of hosts

   The number of hosts (and how they are interconnected) will determine the way the 3174s Gateways (main and backup) should be attached.

* Token-Ring topology

   Any Token-Ring topology is accepted by the 3174 Gateways and by the DSPUs. Bridges are transparent from the Gateways and DSPUs point of view.

5.7.2 Recovery Planning

When the gateway fails, the 3174 DSPUs and all the ring-attached stations that were using their service will start sending a test command to the gateway address (and only to this address). If there is no answer in the ring where the DSPUs are attached they will send every other test command with the broadcast bit on; these commands will be propagated through the bridges if they are present. 3174 DSPUs will keep sending the test command until a backup gateway is activated or the broken one is recovered.

In case of failure of one or more DSPUs, the 3174 Gateway will only attempt to connect them for each CONTACT received from the host (just one for initial processing). In an error situation where the link was operational and fails, the Token-Ring adapter attempts recovery; then VTAM is notified with an INOP, and VTAM may attempt recovery one time depending on what was specified to VTAM. The 3174 Gateway does not make a continual attempt to connect by itself.

Since the 3174 does not have the ability to attach to two different hosts the second controller should be attached to a different host or to a different channel in the same host; this creates full gateway backup and complete recovery scenario from the gateway's and the hosts' point of view

If two gateways are attached to two different hosts and customized with the same Token-Ring address in two different rings, they can be active at the same time. In this scenario, if the main gateway fails, recovery to the backup gateway by the DSPUs will be automatic and almost instantaneous.

* 3174 Gateways with same address

If you have customized two gateway controllers with the same Token-Ring address, the IML and the opening of the Token-Ring adapter for the first controller should be successful. When you IML the second controller, it will try to open its Token-Ring adapter (which cannot be successful due to the duplicate address). It will display a status code of '881-01' (if the two controllers are in the same ring) but will stay operational for its native-attached devices.

If the production gateway fails (activate through NetView commands) any of the DSPUs defined in the Local Major Node of the backup gateway, this command will force the 3174 to open the Token-Ring adapter; this must be successful, since at this time there is no duplicated address in the ring. The activation process continues for all the DSPUs. In case the number of DSPUs to recover is very large, the user may want to include all the necessary commands under a NetView CLIST.

If only one host is present, deactivation/activation of the involved Local Major Nodes is necessary. If Local Major Nodes definitions are located in different hosts, both can be active at the same time.

If both gateways are attached to different rings connected via a bridge, duplicate address checking is not done; in this case, both 3174-01L gateways will come up initially without returning the status code 881.

This is the best recovery approach that can be offered with the 3174 type of Gateway, since it requires only a NetView command from the CNM console with no re-IML of DSPUs and/or movement of people.

- 3174 Gateways with different addresses

  Another alternative could be be that you have a production gateway and a backup gateway with different Token-Ring Addresses. The advantage is that both can be active at the same time in the same ring, and they can share the load of the ring traffic. If one gateway fails, the second can take over if all the DSPUs of the failing gateway are re-IMLed with the other gateway address. Probably this alternative will not be acceptable in most installations.

5.7.3 Recovery Scenario: One host, Two 3174

```
                    ┌─────────────────┐
                    │     Host  A      │
                    │                  │
                    └──────┬────┬──────┘
                           │    │
             ┌─────────────┘    └─────────────┐
             │                                │
        ┌────┴─────┐                     ┌─────┴────┐
        │ 3174-1L  │                     │ 3174-1L  │
        │ ┌──────┐ │                     │ ┌──────┐ │
        │ │#3025 │ │                     │ │#3025 │ │
        │ └──────┘ │                     │ └──────┘ │
        └────┬─────┘                     └─────┬────┘
             │                                 │
        ┌────┴─────────────────────────────────┴────┐
        │                                           │
        └───┬───────────────┬───────────────┬───────┘
            │               │               │
       ┌────┴────┐     ┌─────┴───┐     ┌─────┴───┐
       │ 3174-3R │     │   PC    │     │  S/36   │
       │         │     │         │     │         │
       └─────────┘     └─────────┘     └─────────┘
        DSPU 1          DSPU 2          DSPU 3
```
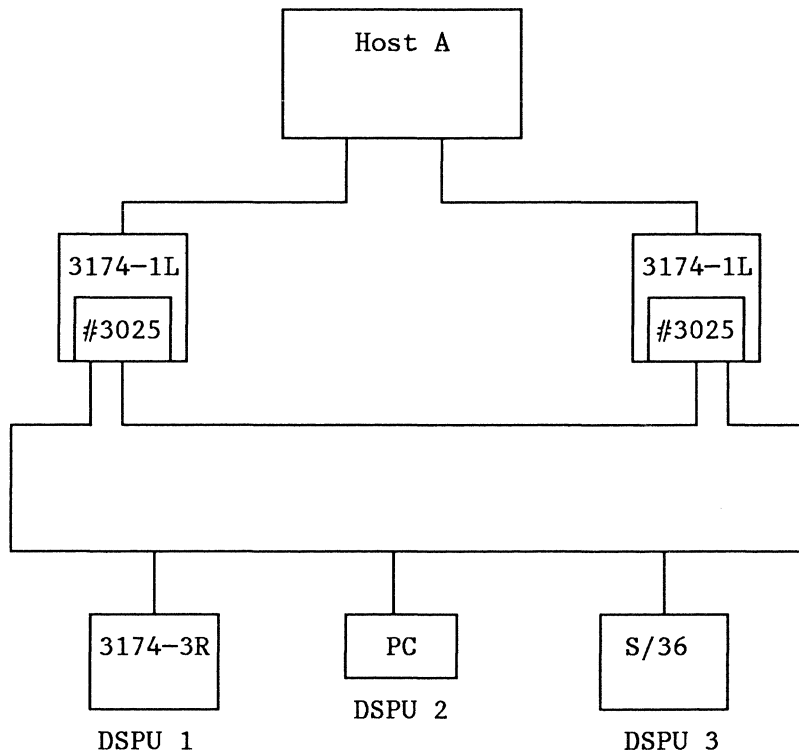
This is the simplest scenario. The second 3174 will be responsible for handling the traffic in case the main 3174 fails.

*   Both gateways have the same Token-Ring address.

*   All DSPUs point to the gateway address. The 3174-3R/53R define this address during the customizing procedure with the answer to question 107.

*   Recovery should be done as described in "Recovery Planning" section.

*   For better reliability, each gateway should be attached to a different host channel.

5.7.4 Recovery Scenario: Two hosts, Two 3174


```
┌──────────────┐        CtC        ┌──────────────┐
│   Host A     │═══════════════════│   Host B     │
└──────┬───────┘                   └──────┬───────┘
       │                                  │
   ┌───┴──────┐                       ┌───┴──────┐
   │ 3174-1L  │                       │ 3174-1L  │
   │ ┌──────┐ │                       │ ┌──────┐ │
   │ │#3025 │ │                       │ │#3025 │ │
   │ └──────┘ │                       │ └──────┘ │
   └───┬──────┘                       └───┬──────┘
       │                                  │
   ┌───┴──────────────────────────────────┴──────┐
   │                                              │
   └────┬──────────────┬─────────────────┬────────┘
        │              │                 │
   ┌────┴─────┐    ┌────┴────┐      ┌─────┴────┐
   │ 3174-3R  │    │   PC    │      │   S/36   │
   └──────────┘    └─────────┘      └──────────┘
     DSPU 1          DSPU 2           DSPU 3
```
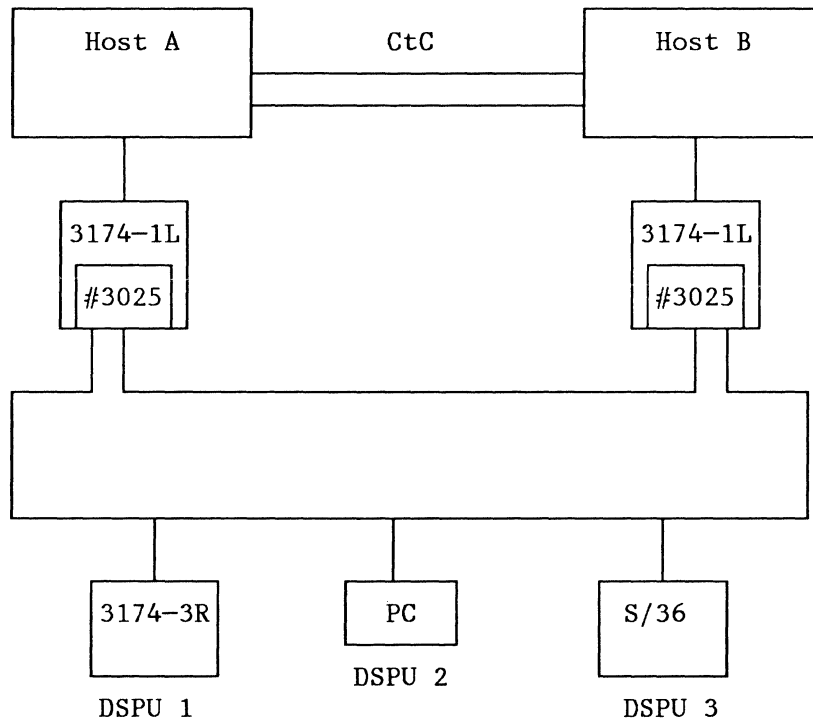
This scenario is more complex than the previous one. Following points should be taken in consideration:

1. There isn't enough traffic flowing through the gateway to justify more than one active gateway at a time.

2. End users need to access applications in both hosts through cross-domain facilities they already have in place. The above figure shows a channel-to-channel facility.

3. In order to provide the best recovery capabilities, the second 3174 Gateway should be attached to Host B.

Recovery:

- Host resources

  As two hosts are available in this scenario, VTAM definitions for network resources can be active at the same time; this will allow you to recover all the DSPUs with only one ACTIVATE command from the CNM console if the gateway or the host fails.

- Failure of main 3174 Gateway controller

  Activation of ring-attached controllers should be done with the procedure already explained. Interactive users of applications in host A should regain access to them through a cross-domain route from host B; users of host B applications will get access to them directly.

- Failure of host A

  In this scenario, the main 3174 will sense that host A is broken and will terminate the sessions for its local terminals but will keep the Token-Ring adapter open, since there was no error in the ring. This adapter should be forced closed before attempting to recover the traffic through the second 3174; otherwise, the backup controller will find a duplicated address and will not open its own adapter.

The only way to force the adapter closed is either to physically disconnect the unit from the Token-Ring Network or to interrupt the controller with an IML (or by powering it off).

Interactive users of applications in host B will get direct connection to this host; users of applications in host A will have to stand by until the host is recovered (or they may access any available application in host B).

- Failure of host B

Users of applications in host A should not be aware that host B is not available; users of host B will have to stand by until the host is recovered or they may access any available application in host A.

5.7.5 Recovery Scenario: Two hosts, Multiple Gateways

```
┌─────────────────┐         ┌─────────────────┐
│     Host A      │   CtC   │     Host B      │
│                 │═════════│                 │
└──┬────────┬─────┘         └───┬─────────┬───┘
   │        │                   │         │
   │        └───────────────────│──┐      │
   │    ┌───────────────────────┘  │      │
   │    │                          │      │
┌──┴──────┐┌─────────┐      ┌──────┴──┐┌─────────┐
│3174-1L  ││3174-1L  │      │3174-1L  ││3174-1L  │  . . .
│ ┌─────┐ ││ ┌─────┐ │      │ ┌─────┐ ││ ┌─────┐ │
│ │#3025│ ││ │#3025│ │      │ │#3025│ ││ │#3025│ │
│ └─────┘ ││ └─────┘ │      │ └─────┘ ││ └─────┘ │
└──┬──────┘└──┬──────┘      └──┬──────┘└──┬──────┘
┌──┴──────────┴────────────────┴──────────┴──────────┐
│   D1          D1             D2          D2         │
│                                           . . .     │
└──────┬────────────┬────────────┬───────────────────┘
       │            │            │
   ┌───┴────┐   ┌───┴────┐   ┌───┴────┐
   │3174-3R │   │   PC   │   │  S/36  │   . . .
   │        │   │        │   │        │
   └────────┘   └────────┘   └────────┘
    DSPU 1       DSPU 2       DSPU 3
```
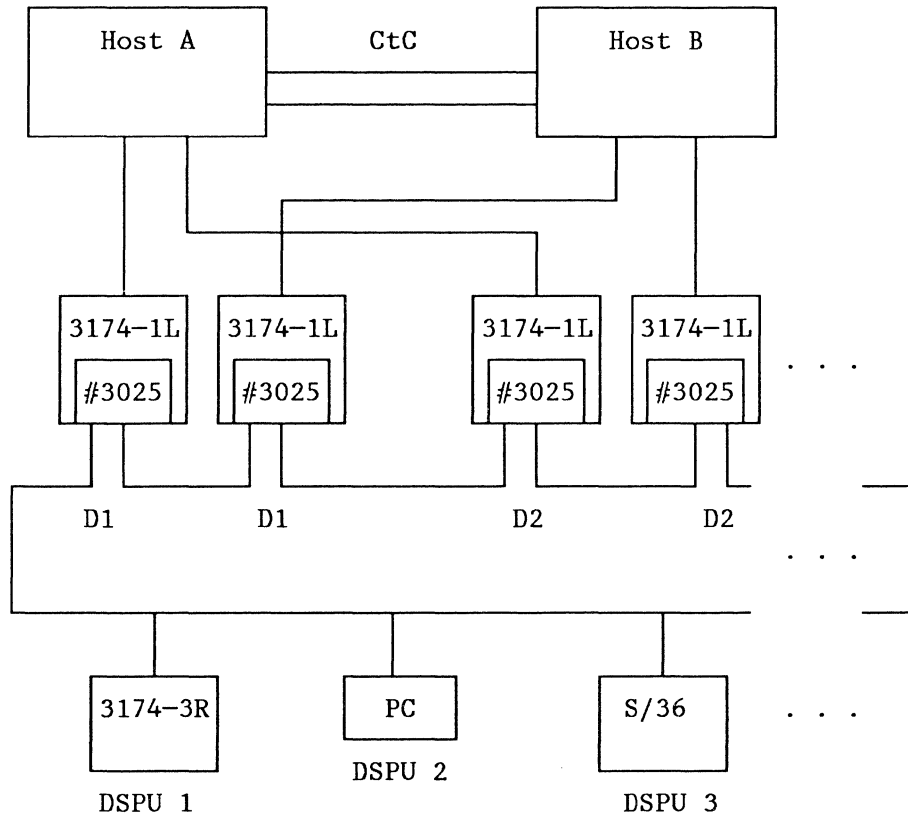
This scenario assumes that traffic through the gateways exceeds 35 to 40 transactions per second, forcing it to have more that one active gateway at the same time. There are three kind of users: a group which accesses applications only in host A, another group which accesses applications only in host B and a third group which accesses applications in both hosts.

Every 3174 Gateway should have a backup gateway customized with the same address but channel-attached to the other host; that is; a main 3174 in address D1 attached to host A and its backup 3174 (with same address, D1) attached to host B.

Recovery procedures are similar to the previous scenarios; the important point to remember here is that backup controller should be attached to a different host. The group of users accessing applications in host A should be routed through the gateway with the D1 address, the group of users accessing applications in host B should be routed through the gateway located in address D2. Multi-host access should be done through the conventional cross-domain links.

5.7.6   Recovery Scenario: Mixed Gateway Types

```
┌──────────────┐      CtC      ┌──────────────┐
│   Host  A    ├───────────────┤   Host  B    │
│              ├───────────────┤              │
└──┬────────┬──┘               └───────┬──────┘
   │        │                          │
   │        └──────────┐    Twintail   │
   │                   │               │
┌──┴────────┐          └───┐   ┌───────┴──────┐
│ 3174-1L   │              │   │ 3725         │
│ ┌───────┐ │              │   │   ┌────────┐ │
│ │#3025  │ │              │   │   │ NTRI   │ │
│ └───┬───┘ │              │   │   └───┬────┘ │
└─────┼─────┘              │   └───────┼──────┘
      │                    │           │
┌─────┴────────────────────┴───────────┴──────┐
│                                              │
└──────┬───────────────┬────────────────┬──────┘
       │               │                │
  ┌────┴─────┐    ┌─────┴────┐     ┌─────┴────┐
  │ 3174-3R  │    │    PC    │     │   S/36   │
  │          │    │          │     │          │
  └──────────┘    └──────────┘     └──────────┘
    DSPU 1         DSPU 2            DSPU 3
```
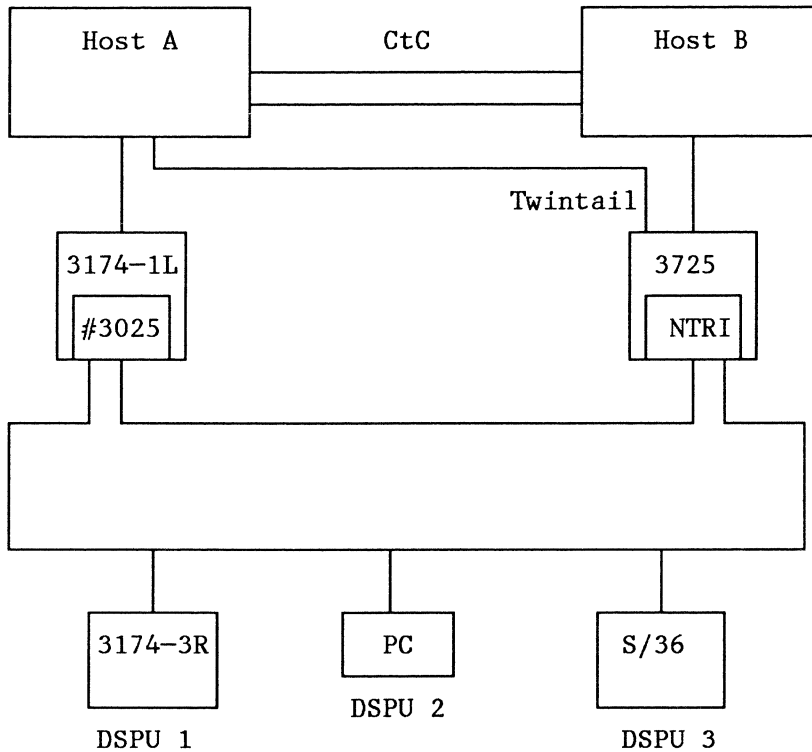
This scenario considers that a 3174 is working as the backup controller for a 3725, or vice-versa; the same considerations given in previous scenarios apply for this one.

One of the most important points to remember is that host definitions for the DSPUs are different depending on the gateway they are using. In the case of the 3174, they are defined as a channel-attached controllers in a Local Major Node, while in the case of the 372X, they are defined as remote controllers in a Switched Major Node.

This scenario combines the best of both worlds; it will be applicable for customers which are installing the Token-ring interface in an already existing 372X and want to have a full backup/recovery scenario without having to install a second 372X

If gateways are attached to different hosts and different rings, both gateways and their VTAM resources for the DSPUs can be active at the same time; in this case, recovery is automatic and almost instantaneous.

5.7.7 Disconnecting/Reconnecting the Token-Ring

The following figure shows the recovery steps necessary if the connector to the Token-Ring is pulled off at the Gateway or at the DSPU.

Operation	Gateway			DSPU		
	Operat. Panel	Adapter Status	VTAM Status	Operat. Panel	Adapter Status	VTAM Status
Gateway T–Ring Connector pulled	880–05	CLOSED 4693 wire f.	ACTIV	583–09	OPEN	PSUB 1
T–Ring reconnect	3174	OPEN	ACTIV	"	"	"
V INACT,F / V ACT DSPU	"	"	"	3174	"	IINOP/ ACTIV
DSPU T–Ring Connector pulled	3174	OPEN	ACTIV	580–05	CLOSED 4693 wire f.	PSUB1
T–Ring reconnect	"	"	"	"	"	"
IML DSPU	"	"	"	505–01	OPEN	"
V INACT,F / V ACT DSPU	"	"	"	3174	"	IINOP/ ACTIV

5.7.8 Hints for 3174 at IML time

If for any reason a 3174 DSPU must be re-IMLed, the result will depend on the status of LU-LU sessions at IML time. If no LU-LU session exists, the controller will become ready immediately at the end of IML. If LU-LU sessions are broken by IML, the PU must be deactivated with the "force" option after IML (and afterwards it must be activated again). Then, the controller becomes available. The status of the LU-SSCP sessions does not matter.

If for any reason a 3174L Gateway must be re-IMLed all LU-LU sessions (to the native attached devices and to devices attached to the DSPUs) are ended logically in VTAM. This means that at the end of the IML process all devices become available (under VM/VTAM, all VM-sessions to CUT devices are reestablished).

If for any reason a 3174 Gateway must be switched offline from the channel, '503' status code displays at the gateway controller and a '583' status code displays at all DSPU controllers. After the gateway is switched back online, all controllers recover the session with the host and display the '3174' status code.

5.8 IBM 3270 Token-Ring Gateway with PC 3270 Emulation Workstations

The PC 3270 Emulation Program is intended to allow a PC user to communicate with host applications written for 3270 devices. Three types of links are supported: SDLC links, Token-Ring Networks, and attachment to a 3270 controller as a DFT device with up to five logical terminals (displays and printers). This section deals only with the PCs in a Token-Ring environment.

In terms of SNA, the displays are acting as LU-T2; PC-attached printers appear as LU-T1 or LU-T3.

File transfer to and from the host is supported with PC 3270 Emulation. In this case, the "Query" Bit must be set in the PSERVIC parameter of the LOGMODE entry used to bind a session with the Workstation-LU. This is necessary because PC 3270 Emulation uses "Structured Fields" in the file transfer protocol. In all other aspects, PC 3270 Emulation behaves like and has the capabilities of a CUT terminal. File transfer is optional and (if customized) can be started from the "Request Task" panel. One of the following host programs is needed as the file transfer upstream partner.

- IBM 3270 PC File Transfer Program, R.1 (5665-311) for MVS/TSO

- IBM 3270 PC File Transfer Program, R.1 (5664-281) for VM/CMS

- IBM CICS/VS PC File Transfer Program, R.1 (5798-DQH) for MVS/VSE-CICS

The format of the SEND and RECEIVE commands depends on the host partner used.

5.8.1 Prerequisites and Coexistence

- PC 3270 Emulation Version 3.0 is required for host connection over the Token-Ring Network.

- DOS 3.2 or later is required for Token-Ring Network products on a PC.

- PC 3270 Emulation V 3.0 can coexist with the PC LAN Program Release 1.2, even if PC LAN is configured as Redirector, Server, Receiver or Messenger.

- If the PC LAN Program is run concurrently with the Standalone mode of the PC 3270 Emulation Program V 3.0, then an additional SAP and Link Station must be allocated with the NETBEUI (or equivalent) command.

- The PC 3270 Emulation program can be accessed from a shared disk, as long as a separate directory is available for each station running emulation.

- The PC LAN program will not start if another application has already initialized the Token-Ring adapter. Therefore, it must be started before PC 3270 Emulation.

- PC 3270 Emulation checks the status of the Token-Ring Network adapter. If the adapter has been already opened by another application, the emulator will not try to reopen it, but will share the adapter (if possible).

- Before PC 3270 Emulation can be started, the Adapter Support Program must be loaded. If a locally administered address is used for the adapter, this must be entered as a parameter of the TOKREUI load command; see Guide to Operations for the Token-Ring Network PC Adapter (P/N 6165874) for the format.

- If PC 3270 Emulation is configured as a Gateway or as Network Station, the NETBIOS Program must first be loaded with the NETBEUI command before PC 3270 Emulation can be started. The Standalone Station configuration interfaces directly to the TOKREUI Program without the need of NETBIOS.

5.8.2 Installation and Customization

PC 3270 Emulation will be delivered on two 360K Bytes PC diskettes. Create a sub-directory (if a hard disk is available) and copy both diskettes into this sub-directory. For detailed information of how to install and handle PC 3270 Emulation see IBM PC 3270 Emulation Program, Version 3.0, User's Guide, (P/N 75X0805).

It would be a nice idea to have a batch file in the root directory for automatic path definitions, loading the Token-Ring adapter and starting (eventually) NETBIOS and the Emulation.

Such a batch file (let us name it EMU70.BAT) could look like this:

```
echo off
path \DOS32;\EDIT;\TOKENL;\EMU3270
cd \TOKENL
TOKREUI 400033301004
rem Load primary adapter with local administered address
if errorlevel 3 goto ER3
if errorlevel 2 goto ER2
if errorlevel 1 goto ER1
if errorlevel 0 goto ER0
rem The adapter load program has set the DOS indicator (ERRORLEVEL)
%ER3
echo ===+ One or both shared RAM locations are invalid
goto EXI
%ER2
echo ===+ One or both adapter addresses are invalid
goto EXI
%ER1
echo ===+ Adapter already loaded with same code, proceed
goto EOK
%ER0
echo ===+ Adapter loaded successfully
%EOK
rem If necessary start here NETBIOS program with the NETBEUI command
cd \EMU3270
PSCPG,f
rem Load the PC 3270 Emulation program
%EXI
cd \
rem Return to route directory
echo on
```

NOTE: The LAN Support program will replace TOKREUI; NETBEUI and these modules will be located in the CONFIG.SYS file instead of a BAT file.

5.8.2.1 Customization Menus

```
Chg Profile        |     |      |        |   | Ext 101 |         |100

                 COMMUNICATION PROFILE TASKS

   ID   ITEM                      YOUR         POSSIBLE
                                  CHOICE       CHOICES

   ┌──────────────────────┐
   │ a   Configuration    │        1          1 = Standalone Station
   └──────────────────────┘                   2 = Network Station
                                              3 = Gateway
                                              4 = Gateway With
                                                    Network Station

   ┌──────────────────────────────────┐
   │ b   Communication Attachment │ 3          1 = SDLC   2 = DFT
   └──────────────────────────────────┘        3 = Token-Ring Network

   c   Alternate Tasks             2          1 = Yes    2 = No
   d   3270 Keyboard               101        1 - 199
   e   3270 Keyboard Remap         2          1 = Yes    2 = No


   f   Create Or Revise Communication Setup
   g   Create Or Revise Modem And Line Description
   h   Create Or Revise Gateway Setup

   z   Return To Task Selection

Type ID Letter To Choose Item, Press Enter:
```

The above menu is selected from the "PC 3270 Emulation Task Selection" Menu (item "b").

- (a): There are two choices for display stations providing PU communications with the host: Standalone or Gateway.

  - Use the Gateway configuration if this PC is to act as a Gateway for other network stations on the same or another ring.

  - The Standalone configuration does not require NETBIOS.

In a Token-Ring environment, a PC configured as a Standalone Station has several advantages over a PC configured as a Network Station. "Standalone" will normally be the configuration of choice.

The main advantages of a Standalone station are

- No additional station is involved in the Gateway function, which will improve performance and availability while eliminating the cost associated with a dedicated workstation.

- Less workstation memory is required because NETBIOS is not required for support of dependent Network Stations.

A disadvantage of using standalone stations could be that each PC is represented with a PU and LU in VTAM and in NCP. There may be some situations where a configuration with Gateway and Net-

work stations would be preferable. These include situations where the number of stations is very large, and thus the number of switched or local PU definitions is excessive. There may also be situations in which the sharing of such resources as high quality printers requires that the shared resource be defined on the same PU as the Display LUs which share it.

- (b): For the communications attachment, selection '3' is required for IBM Token-Ring Network.

- (g): This choice displays the menu dealing with the Token-Ring attachment.

```
Chg Profile        |    |     |       |  | Ext 101 |       |100

                  MODEM AND LINE DESCRIPTION

  ID   ITEM                    YOUR         POSSIBLE
                               CHOICE       CHOICES

  ┌─────────────────────────┐
  │ a   Physical Unit ID     │  A0001
  └─────────────────────────┘

  b   Network Facility          1           1 = Switched
                                            2 = Dedicated
                                            3 = Switched Backup

  ┌─────────────────────────┐
  │ c   SDLC Link Address    │  04
  └─────────────────────────┘

  d   Continuous Carrier        1           1 = Yes      2 = No
  e   Half Speed                2           1 = Yes      2 = No
  f   NRZI Encoding             1           1 = Yes      2 = No
  g   Answertone Generation     2           1 = Yes (Switched Only)
                                            2 = No
  h   End With REQDISCONT       2           1 = Yes      2 = No

  ┌─────────────────────────┐
  │ i   Destination Address  │  23301001
  └─────────────────────────┘

  When Finished With This Menu, Press Enter

  Type ID Letter To Choose ITEM, Press Enter:
```

The above menu is chosen by selecting "g" on the "Communication Profile Tasks" menu (previous pages).

- (a): The Physical Unit ID must match the IDNUM value in the VTAM Switched Major Node if the gateway is a IBM 372x. If the gateway is a IBM 3174-01L, this value has no significance, yet we recommend supplying a unique value, since the gateway might change (e.g. for backup reasons). The IDBLK value inserted into the XID command by the PC 3270 Emulation is equal to that of a real 3274/3174 controller (X'017').

- (c): The SDLC Station address must be the SAP value of the gateway (which is X'04' for the NCP and the IBM 3174-01L).

- The following parameters are not applicable in the Token-Ring Environment:

  - (b) Network Facility

  - (d) Continuous Carrier

  - (e) Half Speed

- ▪ (f) NRZI Coding

- ▪ (g) Answertone Generation

- ▪ (h) End With REQDISCONT

- (i): The value coded for the "Destination Address" must match the last four bytes of the gateway Token-Ring address (the address of the TIC of the 372x or of the Token-Ring adapter of the 3174-01L).

  The PC 3270 Emulation will add the leading four digits (X'4000'). PC 3270 Emulation V3 requires a locally administered gateway address in the range 00000000 through 79999999.

  With a 372X Gateway, this value must be equal to the last 8 digits of the LOCADD parameter of the LINE macro in the "Physical Group" definition of the TIC.

  With a 3174-01L Gateway, this value must be equal to the last 8 digits entered in response to question 900 during customization. Please see "Naming Conventions for Adapter Addresses" at the beginning of this chapter.

5.8.3 Test cases

PC 3270 Emulation has been tested under two different configuration options:

1. Standalone Station.

2. Gateway with Network Station.

No functional deviations could be observed during 3270 emulation.

Session establishment, dialog communication, file transfer and session termination have been tested with two different host environments: 1) TSO under MVS, and 2) CMS under VM/VTAM. No problems and no functional deviations could be observed in these two environments.

Unlike a 3174, NMVT-Alerts are not supported by PC 3270 Emulation V 3.0. This means no alert messages are generated by PC 3270 Emulation to inform NetView of certain problems.

5.8.3.1 File Transfer Performance

A file transfer performance test in our specific environment has shown the following result:

- PC 3270 Emulation configured as Standalone Workstation

- A PC AT with Token-Ring Adapter

- Token-Ring Gateway was 3174-01L

- Host Application was CMS under VM/VTAM

- No additional traffic was on the Token-Ring (or through the 3174-01L).


  ```
  - 62,672 Bytes were transferred in about 23 seconds.
  ```

5.8.4 PC Scenario

Host

```
┌─────────┬─────────┐
│   TSO   │   CMS   │
├─────────┼─────────┤         3174-01L
│   MVS   │ VM/VTAM │    ┌──────────────────┐      ┌───────┐
├─────────┴─────────┤    │                  │──────│ Displ.│
│      VM/CP        │════│   ┌──────────┐   │      └───────┘
│                   │════│   │  #3025   │   │
└───────────────────┘    │   └──────────┘   │
                         └──────────────────┘
```

```
┌──────────────┐   ┌────┐   ┌─────────────────────┐
│              │───│    │───│                     │
│  PC Network  │   │ PC │   │  Token-Ring Network │
│              │───│    │───│                     │
└──────┬───────┘   └────┘   └──────────┬──────────┘
       │          Gateway              │
       │        (PC 3270 Emu)          │
    ┌──┴──┐                         ┌──┴──┐
    │ PC  │                         │ PC  │
    └─────┘                         └─────┘
 Network Station              Standalone Station
                             (PC 3270 Emulation)
```
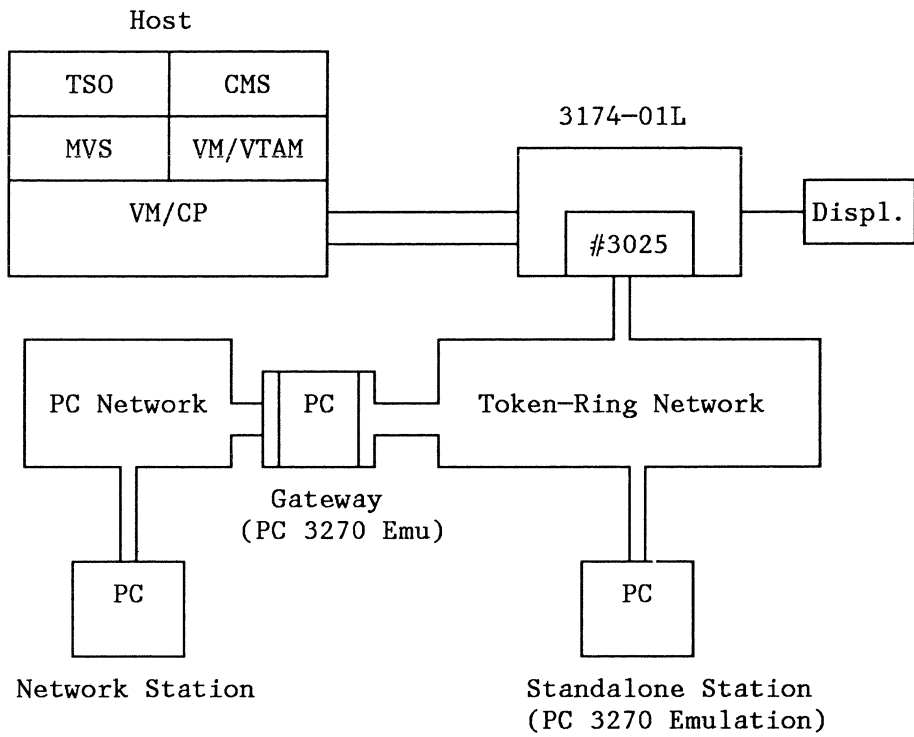
5.9 3174 Gateway and S/36 Considerations

A System /36 can be attached as a downstream PU to a Token-Ring Network and can communicate with a main-frame host via a 3174-01L serving as a gateway. In this environment, the /36 must behave as a PU-T2.0.

5.9.1 Test cases

Unlike other DSPUs discussed until now, the S/36 was attached to a separate Token-Ring Network (Ring 2) and both Networks were connected via a PC serving as a bridge. The bridge for these Token-Ring Networks is fully transparent to the both the gateway and to the DSPUs, easing connection across the two networks.

In the first test case, the S/36 was driven with 3270 Emulation, its logical units behaved as LU-T2. Since the host application was CMS, the VM/CMS logo appeared on the screen of a S/36 display, and CMS could be accessed from them. No problems were experienced during this test.

In the second test case, the S/36 was driven with APPC, so that its logical units behaved as LU-T6.2 units. The host application in this case was MVS/CICS in another domain (subarea 11, see "S/36 Scenario"). For this reason, the APPC-LUs were also defined as cross-domain resources in the CICS host and in the CICS TCT. The owner of the PU/LUs was the CMS host with VM/VTAM (subarea 33). to this host, the S/36 appeared as a local channel-attached SNA PU. On the other hand, the applications in subarea 11 must have been defined as cross-domain resources in subarea 33. The connection between both domains (SSCPs) was provided by VM/CP in the form of a virtual channel-to-channel connection.

5.9.2 S/36 Scenario
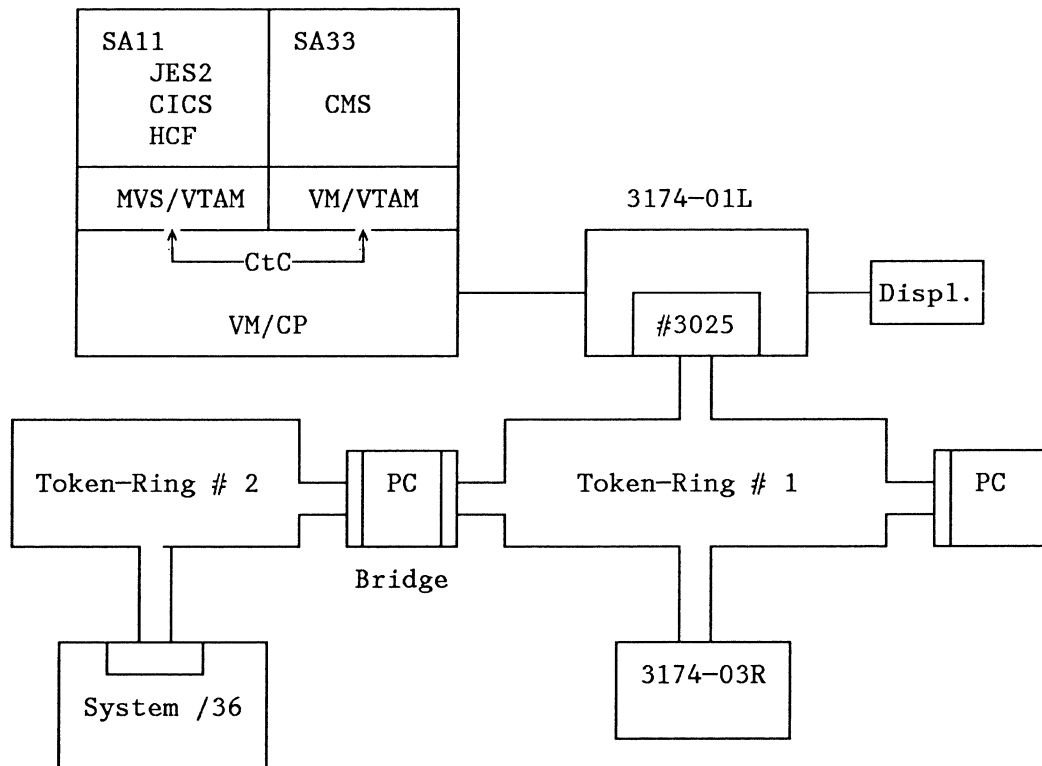
6.0 3174 and X.25 Support

The remote models of the IBM 3174 Subsystem Control Unit can communicate with host systems through an X.25 Packet Switched Data Network (PSDN). The implementation of X.25 support on the 3174 follows the International Telephone and Telegraph Consultative Committee (CCITT) recommendations given in 1980.

It is important to understand that some X.25 knowledge is required when connecting to a X.25 PSDN, and several point must be considered before attempting to customize the 3174.

This chapter details:

- A summary of Facilities and Packet types supported

- Planning for work in X.25

- 3174 configuration and operation hints

- Scenarios used to test the 3174 X.25 feature

Further information can be found in the following manuals:

- 3174 Subsystem Control Unit Models 51R and 52R Maintenance Information (SY27-2573).

- 3174 Subsystem Control Unit Customizing Guide (GA23-0214).

- X.25 SNA Guide (GG24-1568).

- IBM 3270 Information Display System X.25 operation (GA23-0204).

All 3174 models can operate up to a maximum speed of 19.2 Kbps with X.25. The physical interface can be X.21 or X.21 bis. One physical access link to the network is supported, and within that link one virtual circuit can be established. The virtual circuit can be switched or permanent (SVC or PVC). A permanent virtual circuit (PVC) can be thought of as a point-to-point, four wire leased line. A switched virtual circuit can be thought of as a point-to-point, four wire switched line. All the sessions between the host and 3174 attached devices are multiplexed on that virtual circuit. SNA/SDLC protocols are used at higher layers of communication, making the transport system transparent. This allows the user to work as in an SNA environment, establishing sessions with VTAM applications (like TSO, CICS), in one or more domains.

The SNA logical link controls supported by the 3174 are:

- Qualified Logical Link Control (QLLC), logical link control type 3.

- Physical Services Header (PSH), logical link control type 2.

You need to use PSH if the control unit will be connected to a host which is equipped with a frontal NIA. We recommend that you use QLLC whenever possible because it takes advantage of the X.25 integrated support of the IBM SNA host and SNA subsystems. The 3174 access to the network is a 4-wire link using the LAPB protocol (Link Access Protocol Balanced).

The following X.25 options are supported by the control unit:

- Data Packet sizes of 64, 128, 256, or 512 bytes.

- Packet-size negotiation.

- Modulo 8 or 128 for packet level sequence numbering.

- Packet window sizes of 1 to 7 for modulo 8.

- Packet window sizes of 1 to 11 for modulo 128.

- Packet window size negotiation.

- Connection Identifier.

- Recognized Private Operating Agency (RPOA).

- Closed User Group.

- Reverse charging.

- Throughput class negotiation.

This options are specified when the customizing process take place. A more detailed explanation is provided later on in this chapter.

6.1   Planning for X.25.

This section provides some guidance and suggestions for the attachment of a 3174 to a X.25 network.

When planning the network, one of the first aspects to consider is the (economic) cost. 3174 planners must remember that packet-switched network costs are usually volume dependent, regardless of whether switched or permanent virtual circuits are used or the distance between the communicating ends. Packet switched networks may be a more economical alternative for terminal locations that are widely dispersed and have low traffic volumes. It is up to the user determine when is more economical to use conventional leased lines or circuit-switched networks.

It is necessary to be aware that there are no guarantees for continuous throughput; frequently, PSDNs use flow control mechanisms like window sizes or maximum packet length in order to regulate the input/output rate for all users. The user should have a realistic idea of the response time that can be expected. Good performance can be obtained with a careful planning and tuning of the definitions used in the network.

A meeting between the company providing the X.25 facilities (PTT) and the installation network planner should be set up to discuss installation plans and needs. It is necessary to make a review of the PSDN facilities, the parameters supported by the control unit, and the software used in the host site to determine which facilities of the network will be used. They must be known prior to customizing the 3174.

Following are some considerations that the customer may wish to take into account. The list can be expanded according to the needs of the user.

- Line speed

- Type of virtual circuit (SVC or PVC)

- Number of logical channel to be used

- Frame window size

- Packet window size

- Parameter negotiation

    This optional facility allows the negotiation of data flow control parameters on a calling basis, and it is applicable to SVCs only. When an SVC is established, the DTE and DCE agree about the packet and packet window size. There are two packets and window sizes; one for each direction.

- Closed user group

  This facility provides better security, because only SVCs between DTEs of the same group can be established.

- Reverse charge

  This option permits the data communication expenses to be centralized.

- Default throughput class assignment

  Optional facility which provides network subscription class of a default throughput class from a list of classes supported by the network.

Once the planning phase is over, the 3174 can be customized.

6.2 Customizing.

In order to make the customization process easier the 3174 Customizing Guide (GA23-0214) provides sample worksheets of the X.25 customization panels

6.2.1 Question 101: Host attachment

When customizing for X.25, the response to this question must be '3'.

6.2.2 Question 215: Physical unit identification

If you are working with a Switched Virtual Circuit (SVC) you must give a unique identification number to the physical unit. This answer must match with different parameters depending on the host the 3174 is working with.

- IDNUM of the VTAM Switched Major Node

- REMOTE XID of the System/36

- EXCHID of the System/38

6.2.3 Question 400: Network type

00 = CCITT network, 02 = UKPSS or TELENET.

UKPSS = Britsh Telecom

TELENET = GTE Telenet Communications Corporation

6.2.4 Question 401: Circuit type

The 3174 can support four circuit types. The type of virtual circuit is defined according to the capability of the control unit to initiate a call and the subscription option with the network.

1. Permanent virtual circuit

2. Incoming virtual circuit, used only when the DTE host can initiate the call in an SVC environment.

3. Outgoing virtual circuit, used only when the 3174 can initiate the call in an SVC environment.

4. Two-way virtual circuit; in this case, either the 3174 or the host can initiate the call.

6.2.5 Question 402: Logical channel identifier

Number of the logical channel used for the control unit to communicate with the network. Normally, the network administrator gets this number from the PTT.

6.2.6 Question 403: Logical link Control (QLLC):

0 = PSH control, 1 = QLLC control

This definition must match the Host definition. The 3174 can work with QLLC or PSH. (Work with QLLC whenever possible). These definitions can be changed on the dial screen.

6.2.7 Question 409: X.25 Keyboard support options

This question allows you to choose how to use X.25 Extension Mode Keys.

*   Bits 1 and 2: Disc key

    This option determines whether the disconnect key can be used and from where it can be used.

*   Bits 3 and 4: LOCAL & COMM Keys

    This option defines if the Local and COMM keys are supported and what terminal can use them.

*   Bit 5: X.25 extension keys

    Defines whether the extension keys will be supported on all attached CUT terminals, or only from the terminal attached to port 0.

*   Bit 6: Dial Keys

    Display all fields on the dial screen or only the HNAD (Host Network Address).

*   Bit 7: DISC/LOCAL

    Specifies whether the disconnect will be delayed or immediate.

6.2.8 420: Incoming call options (IOPT)

Specifies the facilities supported by the control unit and the network that will be in effect when the host is trying to make a call to the 3174. Please refer to the network subscription to determine which facilities will be used. Please keep in mind that this definitions can be changed on the dial screen.

*   Bit 0: Host DTE Address

    Indicates whether the Host DTE address will be validated or not.

*   Bit 1 and 2: Reverse Charge facility

    Tells the control unit whether incoming calls with reverse charge will be accepted or not.

*   Bit 3: Negotiated Packet size (NPKT)

    Tells to the control unit whether incoming calls that trying to negotiate the packet size will be accepted not.

*   Bit 4: Negotiated Window size (NWS)

    Determines whether Incoming calls that want to change the maximum number of packets that can cross the DTE/DCE interface before receiving an acknowledgment will be accepted.

*   Bit 5: Connection Identifier

Validates the connection identifier password.

- Bit 6: Throughput Class Negotiation

  Accepts or rejects incoming calls that want to change the communication speed.

- Bit 7: Reserved.

6.2.9 Question 421: Outgoing call options (OOPT)

Specifies the facilities supported when the control unit is trying to make a call to the host. Please refer to the network subscription in order determine what facilities will be used. Keep in mind that this definitions can be changed by using the dial screen (setting bit 6 in question 409).

- Bit 0 : Indicates whether the 3174 DTE address will be supplied.

- Bit 1 2: Reverse Charge facility. Specifies if the control unit will try to make calls with reverse charge.

- Bit 3 : Negotiated Packet size (NPKT). Defines that the control unit will try to negotiate the packet size during the session establishment.

- Bit 4 : Negotiated Window size (NWS). Indicates that 3174 want to change the packet window size for this call.

- Bit 5 : Determine whether the connection identifier password will be supplied.

- Bit 6 : Throughput Class Negotiation. Determine whether to change the communication speed in outgoing calls. This options is not supported by NPSI, but the user could get support by the use of DATE facility.

- Bit 7 : Reserved.

6.2.10 Question 423: Host DTE address (HNAD)

Enter a maximum of 15 digit for host telephone number. This definition can be changed on the dial screen.

6.2.11 Question 424: 3174 DTE address

Enter a maximum of 15 digits for 3174 telephone number.

6.2.12 Question 430: Negotiated packet size (NPKT)

Defines the packet size that can be supported for the control unit when a negotiation takes place. This definition can be changed on the dial screen. Refer to the network subscription for more information. This answer must match the host definitions.

6.2.13 Question 431: Packet sequence numbering

Type of sequencing in the DCE/DCE interface. This answer defines whether modulo 8 or 128 is used. Refer to the network subscription for more information. This answer must match the host definitions.

6.2.14 Question 432: Negotiated window size (NWND)

Defines the packet window size range that can be supported by the control unit when a negotiation takes place. This answer can be changed on the dial screen. Refer to the network subscription for more information. This answer must match the host definitions.

6.2.15 Question 433: K-Maximum out

A number from 1 to 7. It indicates the maximum number of frames that the control unit can send or receive before sending or receiving an acknowledgment. Essentially is a checking mechanism used to ensure that the exchange of information is free of errors. For an error-free access line, better throughput will be obtained if the largest value is used. Refer to the network subscription for more information.

6.2.16 Question 434: None Standard default packet size (DPKT)

Used if negotiation is not done or when the control unit is working with a PVC. This answer can be changed on the dial screen. This definition must match the host definitions.

6.2.17 Question 435: None Standard default window size (DWND)

This answer specifies the packet window size range. Used if negotiation is not done or when the control unit is working like a PVC. This answer can be changed on the dial screen. Refer to the Network subscription for more information.

6.2.18 Question 440: Throughput class negotiation (TCLS)

Set priority to the packet when a negotiation take places. A value entered here will be included in the outgoing call request, and will be used to determine whether to accept the incoming calls. This answer can be changed on the dial screen. Refer to the Network subscription to determine whether the facility is supported

6.2.19 Question 440: Closed user group (CUG)

Optional. A value entered here will be included in the outgoing call request. This answer can be changed on the dial screen. Refer to the Network subscription to check whether the facility is supported.

6.2.20 Question 440: Recognized private operating agency (RPOA)

Optional. When a value is specified, it will be used to route the packet in a Multi-PSDN. This answer can be changed on the dial screen. Refer to the Network subscription to check whether the facility is supported.

6.2.21 Question 450: Link level transmit timeout

Specified in 0.1 second intervals. Refer to the Network subscription for the value.

6.2.22 Question 451: Number retries

Number of retries required. Refer to the Network subscription for the value.

6.2.23 Question 451: Connection Identifier password (CID)

A value entered here defines the access password; if validation was selected, it will be used to determine whether to accept the incoming calls. This password can be changed on the dial screen. And it will be included in the outgoing call request.

6.3   3174 Operating Procedures

When the control unit is ready to work, some operational considerations must be taken into account depending on what type of virtual circuit is used. If a 3174 is working with a PVC, the operation of the controller is similar to a leased SDLC line.

However, when the 3174 is working with a switched virtual circuit, considerations must be taken prior to installing the control unit in a productive environment. This section explains the dial procedure needed to call from the 3174. From an operational point of view, there are no differences between the 3174 and the 3274 control units.

The 3174 permits the operator of an attached CUT device (like a 3278, or 3178), to initiate an outgoing call or modify the incoming call parameters. To support X.25 SVC, specific key functions are provided at the display. The procedure needed to enable these specific keys can be summarized in the following way: Press and hold the Alt key; press and release the extension key (Erase Eof); release the Alt key. The extended keys make the following functions available:

*   Dial key

    The first key on top row. This key permits you to connect the 3174 to the host thru an outgoing call, or change the incoming call parameters using the dial screen shown in the following figure.

```
    HNAD        =       @123456789012345@


    CID         =       @A0000076@
    NPKT        =       @1@
    NWND        =       @07@
    RPOA        =       @1898@
    CUG         =       @32@
    QLLC        =       @1@
    TCLS        =       @9@
    DPKT        =       @1@
    DWND        =       @02@
    OOPT        =       @00000000@
    IOPT        =       @00000000@
    I/O         =       @0@
```

The @ character delimit entry fields.

The I/O field is displayed only in two-way calls. It defines whether the new values entered will only be stored (and will be valid until next IML or next change) or if the 3174 will initiate an outgoing call (value 0) with the values displayed on the dial screen. An explanation for the rest of input field is provided in the Customizing section of this chapter.

NOTE: The dial screen is displayed only if bit 6 of the question 409 on panel 332 is set.

The dial screen can be reset after an unsuccessful call by pressing the Reset key after pressing the Clear key.

- Disc key

  Allows you to disconnect the 3174 from the X.25 network. The 3174 may have been configured to send an Operator Check indicator if an active SNA session is present. If the DISC key is pressed again, the disconnect process takes place by sending a clear request packet from the control unit. However, if the RESET key is pressed after the first DISC the process is reset.

  If no SNA sessions are active, the disconnect process is made automatic after the DISC Key is pressed.

- LOCAL key

  This key permits the user to disconnect the 3174 from the X.25 link. Process to disconnect the 3174 from the network is the same as with the DISC key.

- COMM key

  Permits the user to reconnect the 3174 to the X.25 link. For PVC operations, the LOCAL and COMM keys can be used for disconnect and reconnect operations. The customizer has the option of deleting this keys in order to eliminate operator intervention.

6.4 Packet Types

Common packet types are used by the 3174 Control Unit in a X.25 environment. A brief description of the different packet types follows. Use of these packet types are described in the test scenarios, later on in this chapter. Control Unit Maintenance Information Guide.

- Call request

  Sent by a 3174 operating in an SVC circuit, when an outgoing call is made using the dial operation. The packet contains the host's telephone number, and the specified options that must match with the user's subscription.

- Incoming call

  Received by the control unit in a SVC when the host is initiating a call.

- Call accepted

  Sent after one incoming call arrives to a 3174 working in an SVC circuit.

- Call connected

  Received as a confirmation of the 'call request' sent to the remote DTE. The SVC circuit is now in 'data ready' state and SNA data flow begins.

- Clear Request

  Sent by the 3174 when certain errors are detected (logged) or when a DISC operation is issued. (SVC only)

- Clear indication

  Received as a result of a normal clearing sequence, or as a result of problems detected by the network or the remote DTE. In the last case, the control unit logged the cause and diagnostic codes. The control unit answers this packet with a clear confirmation packet. (SVC only)

- Clear confirmation

Sent by the 3174 as an acknowledgement of the receipt of a clear indication packet. (SVC only)

- Reset request Sent by the 3174 connected to a PVC when it detects certain X.25 errors or when the Local operation is specified. In the first case, the control unit logs the cause and diagnostic codes.

- Reset indication

  Received by the control unit when a problem is detected by the network or by the remote DTE.

- Reset confirmation

  Sent by the 3174 as acknowledgement of a reset indication packet.

- Restart request

  The 3174 sent the restart request packet because it has detected certain X.25 errors, the local key has been pressed, or an open link operation has been performed. Open link is performed when:

  1. The 3174 is IMLed.

  2. Local mode has been entered and COMM key has been pressed.

  3. The link has been closed because of an error condition.

- Restart Indication

  Received from the remote DTE when it wants to initialize the packet level. The 3174 response with a Restart Confirmation packet.

- Restart Confirmation

  Indicates the end of the link initialization.

- Data

  Used to receive or transmit data once the circuit has been established.

- Receive Not Ready

  Can be sent or received by the control unit. When it is received, transmission is stopped until a Receiver Ready packet is received.

- Receive Ready

  Sent in response to any packet that is received unless an outgoing data packet is ready for transmission. Receipt of a Receive Ready packet indicate that the transmission by the 3174 may continue.

- Diagnostic

  From a Reset, Clear or Restart packet, the control unit logs this information.

6.5   Test Scenarios

The 3174 was tested with different hosts (System/36, System/38, and System 308X) installed at the Raleigh International Technical Support Center.

Data flow is presented in the following sections as a result of different tests made with the 3174 in an X.25 environment. They can be taken as a guideline of the normal control flow. Scenarios for System/38 are not presented here because data obtained was exactly the same as for System/36.

The following IBM products were used:

- 3174 Subsystem Control Unit. Microcode level A1.4.

- NPSI Network Packet Switched Interface. V1.R4.3.

- VTAM Virtual Telecommunication Access Method. V3.R1.1.
- NCP Network Control Program. V4.R2.0.
- X25 Interconnection PRPQ V1.R1.0. (XI).
- System/36, System Support Program Release 5.
- System/38, CPF Release 8.

6.5.1   3174 as a PVC

Different scenarios were studied with the 3174 in a PVC environment. The connection to a VTAM system and System 36/38 were tested; the results can be observed in the following figures.

6.5.1.1   Access to VTAM System

This test includes host access using a PSDN (Case A) and using XI instead of X.25 Network (Case B). Flows and configurations are shown next.

Case A. Connecting through TYMNET.

SABM ——————→   IML
   . . .   Process
DISC ——————→
   . . .
SABM ——————→
   . . .
     ←————— UA
     ←————— Restart Request
Restart Confirm ——————→

QSM ———————————————→
    ←——————————————— QUA

ACTPU ———————————————→
    ←——————————————— +RSP

   . . .
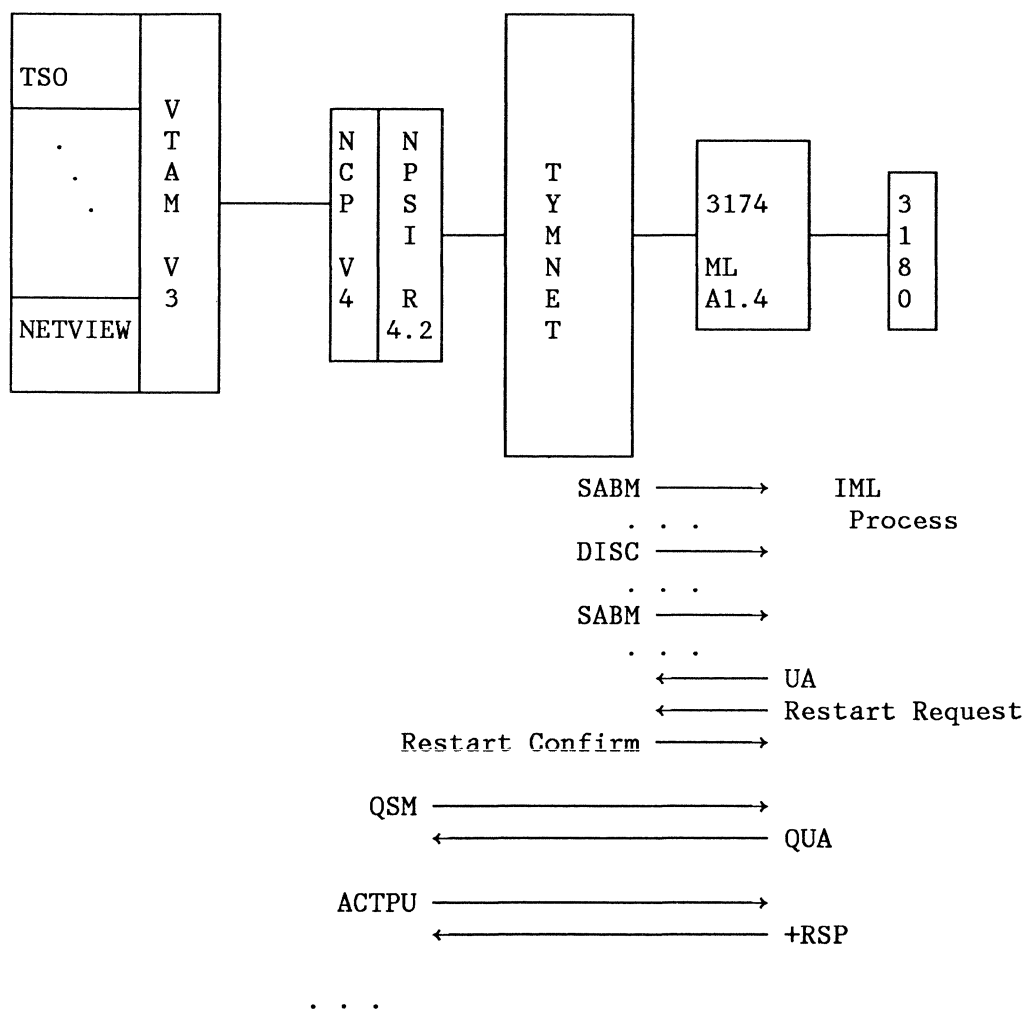
Case B. Using XI. The following scenario shows the configuration used for Case B. As it can be seen, XI was used instead of the X.25 Network.

```
┌──────────┬────┐
│ TSO      │ V  │
├──────────┤ T  │        ┌───┬───┬───┐
│    .     │ A  │        │ N │ N │ X │
│          │ M  │        │ C │ P │ I │            ┌────────┐
│    .     │    │        │ P │ S │   │            │ 3174   │        ┌───┐
│          │ V  │────────│   │ I │   │────────────│        │────────│ 3 │
│    .     │ 3  │        │ V │   │   │            │ ML     │        │ 1 │
│          │    │        │ 4 │ R │ R │            │ A1.4   │        │ 8 │
├──────────┤    │        │   │4.2│ 1 │            │        │        │ 0 │
│ NETVIEW  │    │        └───┴───┴───┘            └────────┘        └───┘
└──────────┴────┘
```

```
              Disc Mode   ──────────→      IML
                          .  .  .          Process


                          ←──────────      Flag
              Disc Mode   ──────────→
                          ←──────────      SABM
                    UA    ──────────→
                          ←──────────      Restart Request
       Restart Confirm.   ──────────→

       QSM  ─────────────────────────→
            ←─────────────────────────      QUA

 ACTPU  ─────────────────────────────→
        ←─────────────────────────────      +RSP


       .  .  .
```
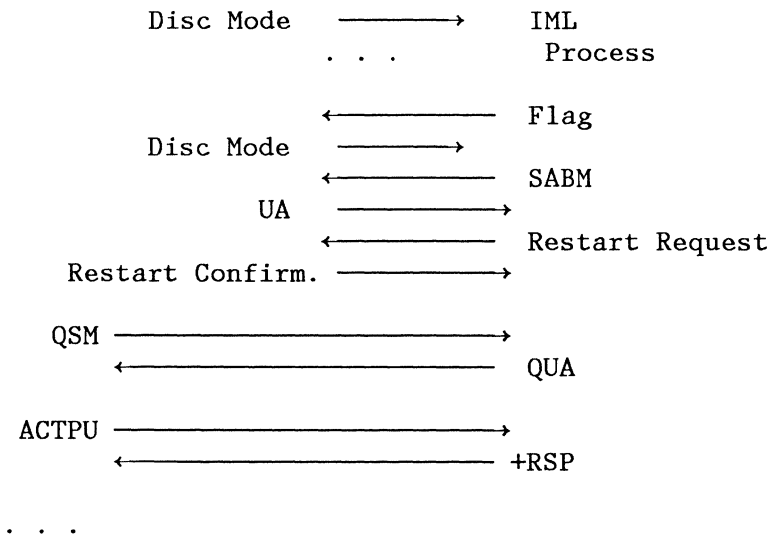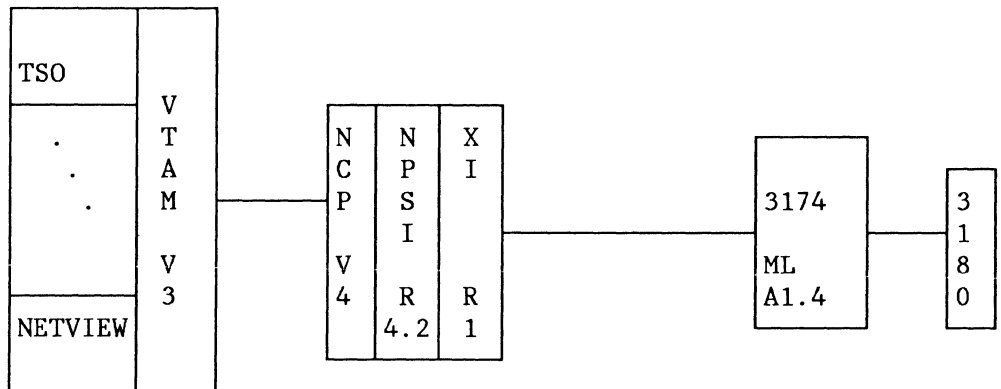
6.5.1.2 *Access to System/36*

Again, two different scenarios were tested.

1. Case A: Access the host using a PSDN.

2. Case B: Access the host through XI.

Configurations for these tests and the resulting data flows are presented below:

Case A. Connecting through TYMNET.

```
┌──────────────┐        ┌─────┐
│              │        │     │
│              │        │     │
│ System 36    │        │  T  │
│              │        │  Y  │       ┌────────┐   ┌───┐
│ Microcode    │────────│  M  │       │ 3174   │   │ 3 │
│ Level        │        │  N  │───────│        │───│ 1 │
│              │        │  E  │       │  ML    │   │ 8 │
│              │        │  T  │       │ A1.4   │   │ 0 │
│              │        │     │       └────────┘   └───┘
│              │        │     │
└──────────────┘        └─────┘
```

```
                    DISC  ─────────▶      IML
                           . . .           Process
                    DISC  ─────────▶
                          ◀────────  FLAG
                    SABM  ─────────▶
                          ◀────────  UA
                          ◀────────  Restart Request
    Restart Confirm  ────────▶

QXID  ─────────────────────────────▶
      ◀─────────────────────────────  QXID

 QSM  ─────────────────────────────▶
      ◀─────────────────────────────  QUA

ACTPU  ────────────────────────────▶
      ◀─────────────────────────────  +RSP


            . . .
```
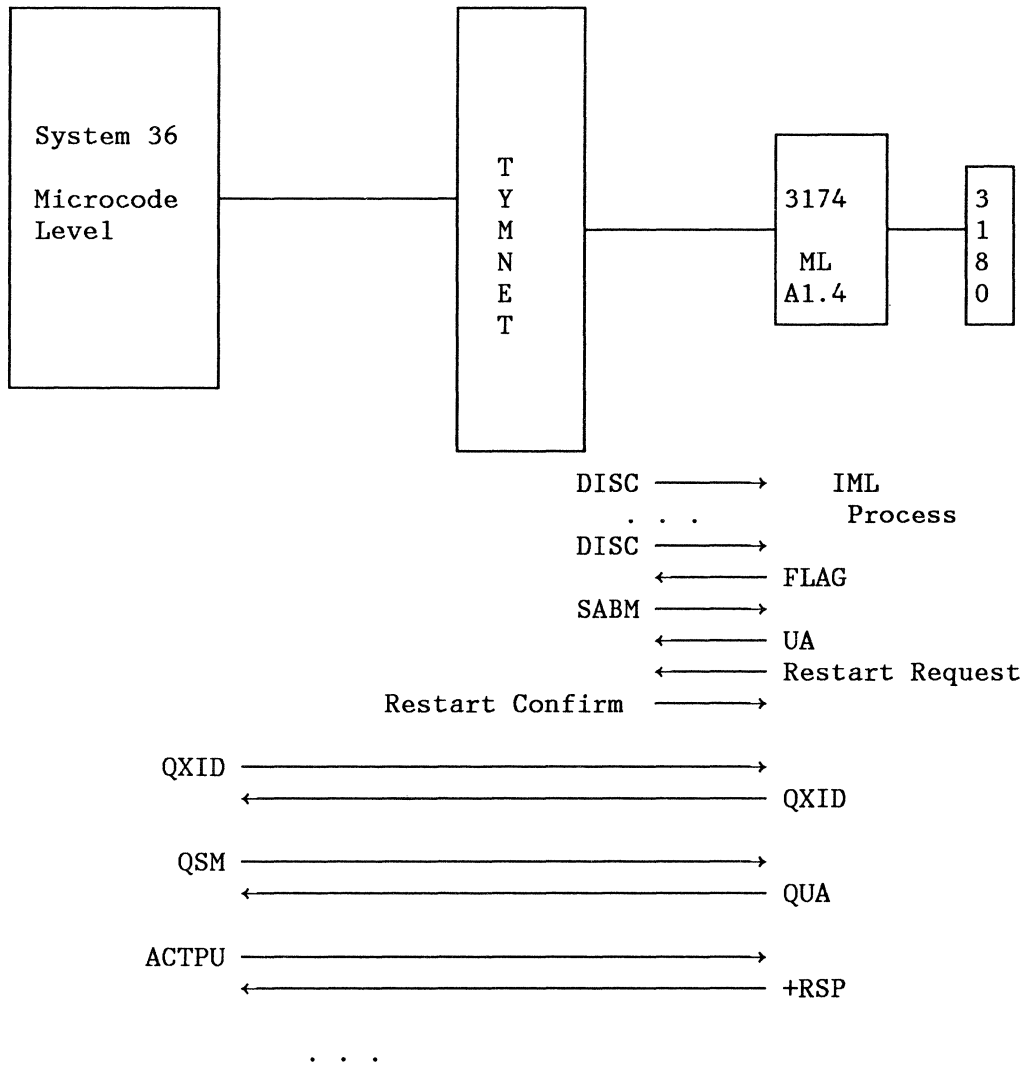
Case B. Connecting through XI, using XI as a DCE.

```
┌─────────────┐        ┌──────────┐
│             │        │ NCP  V4  │
│             │        │          │
│             │        │    +     │
│ System 36   │        │          │          ┌────────┐      ┌───┐
│             │        │ XI  R1.0 │          │ 3174   │      │ 3 │
│ Microcode   │────────│          │──────────│        │──────│ 1 │
│ Level       │        │    +     │          │ ML     │      │ 8 │
│             │        │          │          │ A1.4   │      │ 0 │
│             │        │ NPSI     │          └────────┘      └───┘
│             │        │    R4.3  │
└─────────────┘        └──────────┘
```

```
                       DISC  ─────────►      IML
                        . . .                Process
                            ◄───────── FLAG
                       DISC  ─────────►
                            ◄───────── SABM
                        UA  ─────────►
                            ◄───────── Restart Request
              Restart Confirm  ─────────►

    QXID  ───────────────────────────────►
         ◄─────────────────────────────── QXID

    QSM   ───────────────────────────────►
         ◄─────────────────────────────── QUA

   ACTPU  ───────────────────────────────►
         ◄─────────────────────────────── +RSP


         . . .
```
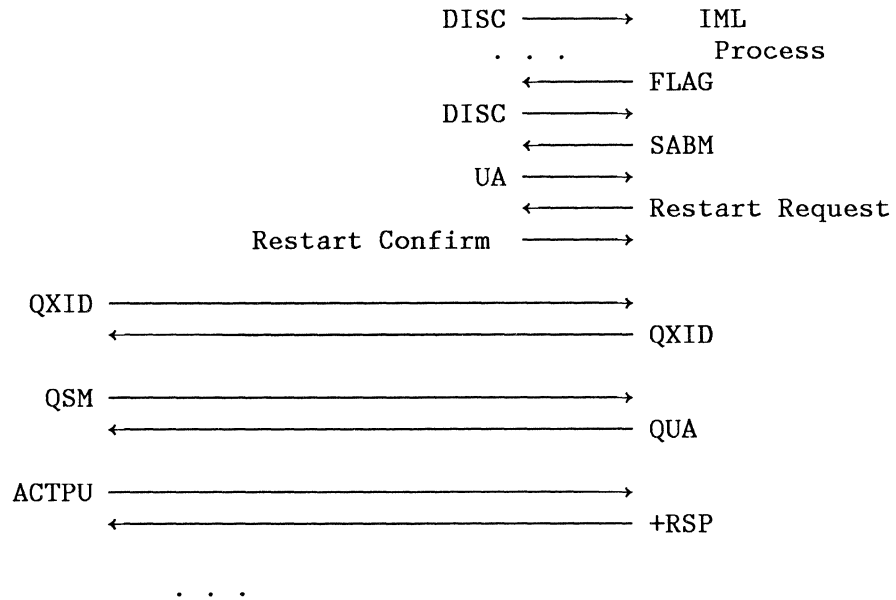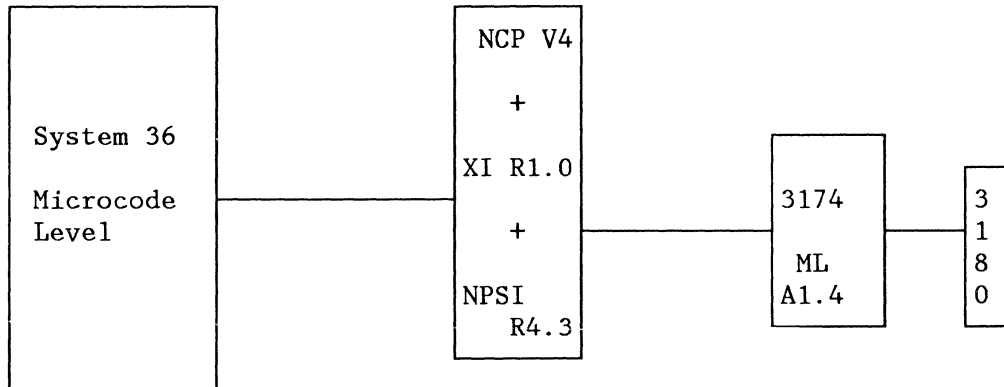
6.5.2   3174 as an SVC

The ability of the 3174 to work in a Switched Virtual Circuit was tested too; in one test the control unit started the connection by making an outgoing call and in the other, the 3174 waited for the call which is initiated from the host. Connections to a VTAM system and System 36/38 were tested again.

6.5.2.1   Access to VTAM System.

This test included host access using a PSDN, (Case A) and the XI test, (Case B). The incoming call and the outgoing call capability of the 3174 were tested.

Case A. Connecting through TYMNET. Outgoing call.

```
┌─────────────┐  ┌─────────┐   ┌───────┐  ┌───────┐  ┌──────┐
│TSO      │ V │  │ N │ N │   │   T   │  │       │  │+─────│
│         │ T │  │ C │ P │   │   Y   │  │ 3174  │  │ 3    │
│  .      │ A │  │ P │ S │   │   M   │  │       │  │ 1    │
│  .      │ M │  │   │ I │   │   N   │  │ ML    │  │ 8    │
│  .      │ V │  │ V │   │   │   E   │  │ A1.4  │  │ 0    │
│         │ 3 │  │ 4 │ R │   │   T   │  │       │  │      │
│NETVIEW  │   │  │   │4.2│   │       │  │       │  │    @ │
└─────────────┘  └─────────┘   └───────┘  └───────┘  └──────┘
```

```
                          DISC ─────────→      IML
                            .  .  .               Process
                          DISC ─────────→
                            .  .  .
                               ←───────────── Flag
                          SABM ─────────→
                               ←──────────── UA
                               ←──────────── Restart Request
               Restart Confirm ─────────→

                    ←─────────────────────────── Call Request
         Call Accepted ───────────────────────→

              QXID ──────────────────────────→

                    ←─────────────────────── QXID
                    (IDBLK=017, IDNUM=A0076)

               QSM ──────────────────────────→
                    ←────────────────────────── QUA

         ACTPU ──────────────────────────────→
               ←──────────────────────────────── +RSP

          NMVT ──────────────────────────────→

                    .  .  .
```
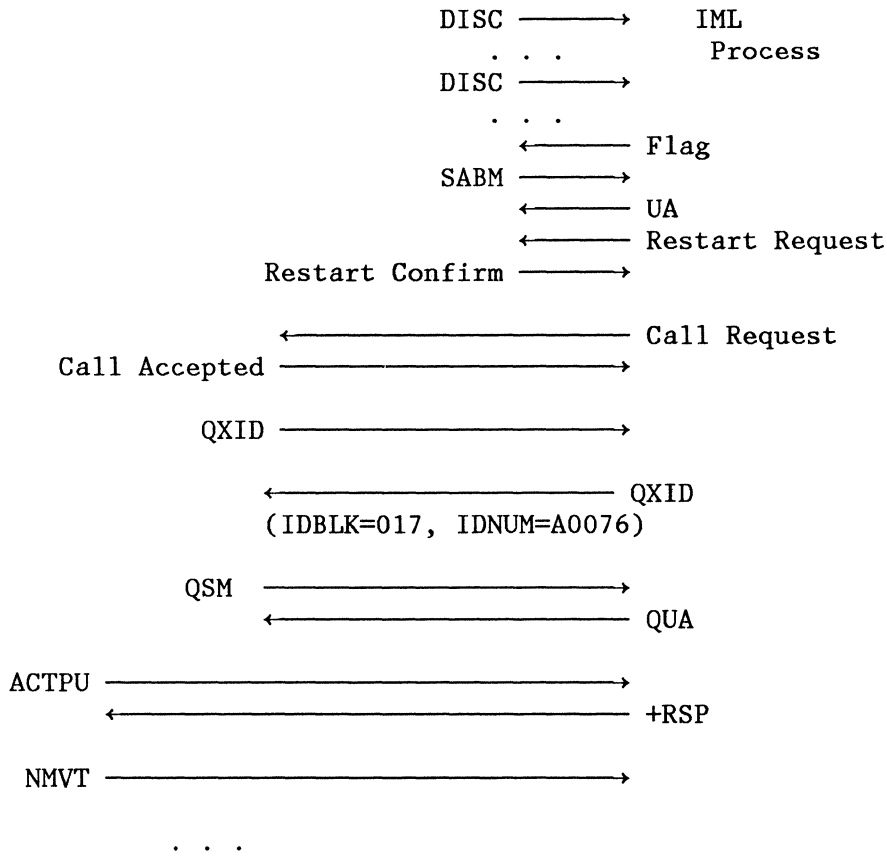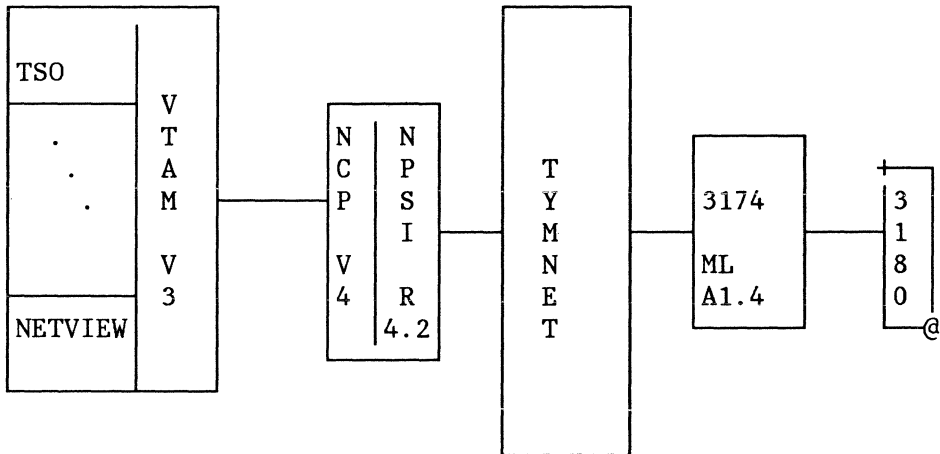
Case B. Using XI. Incoming call.

```
┌──────────┬─────┐        ┌───┬───┬───┐         ┌──────────┐      ┌───┐
│ TSO      │  V  │        │ N │ N │   │         │          │      │ 3 │
│          │  T  │        │ C │ P │ X │         │  3174    │      │ 1 │
│   .      │  A  │        │ P │ S │ I │         │          │      │ 8 │
│     .    │  M  │────────│   │ I │   │─────────│  ML      │──────│ 0 │
│       .  │     │        │ V │   │ R │         │  A1.4    │      │   │
│          │  V  │        │ 4 │ R │1.0│         │          │      │   │
│ NETVIEW  │  3  │        │   │4.2│   │         │          │      │   │
└──────────┴─────┘        └───┴───┴───┘         └──────────┘      └───┘
```

```
                                             . . .
                          DISC ─────────────────►

                                             . . .
                          DISC ─────────────────►
                               ◄───────────── SABM
                            UA ─────────────────►
                               ◄───────────── Restart Request
          Restart Confirm ─────────────────►

    Call Request ───────────────────────────────►
                 ◄─────────────────────────────── Call Accepted

             QXID ───────────────────────────────►

                  ◄─────────────────────────────── QXID
                  (IDBLK=017,  IDNUM=A0076)

              QSM ───────────────────────────────►
                  ◄─────────────────────────────── QUA

    ACTPU ──────────────────────────────────────►
          ◄────────────────────────────────────── +RSP

    NMVT ────────────────────────────────────────►

             . . .
```
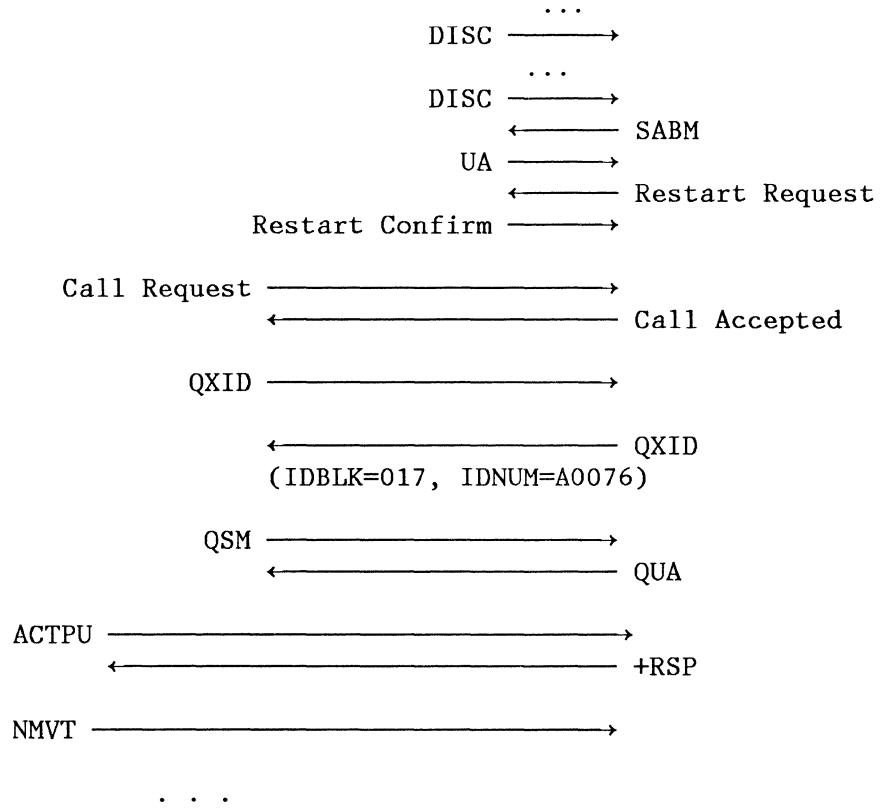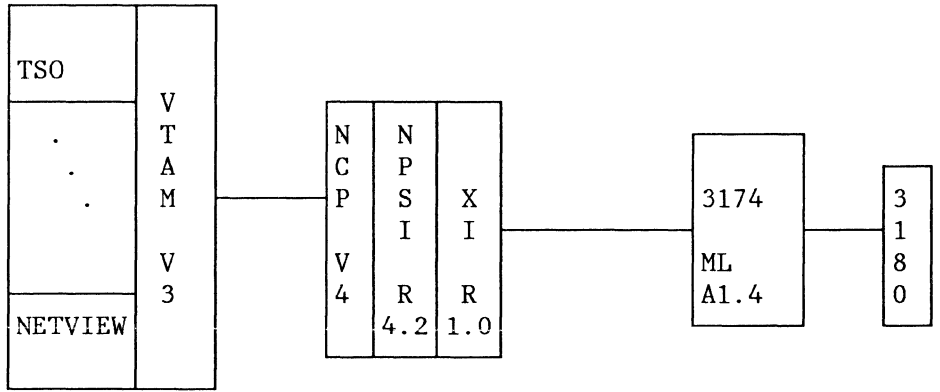
Appendix A. 3174 Publications

A.1 IBM 3174 Subsystem Control Unit Functional Description (GA23-0218)

This book describes how the 3174 interprets and executes the 3270 data stream and communicates with the host and terminals. It can be used as a reference book to look up information quickly or as an educational tool by reading the overview and selected chapters.

It is intended for anyone who needs data stream level information about the 3174 for writing programs or researching network problems.

The manual is organized as follows:

- Part One - Introduction

    - Chapter 1 - 3174 Overview

- Part Two - The 3270 Data Stream

    - Chapter 2 - 3270 Orders Attributes and Commands

    - Chapter 3 - 3270 Structured Fields

    - Chapter 4 - Control Unit Terminal (CUT) Functions

- Part Three - Host attachment

    - Chapter 5 - Local Operation

    - Chapter 6 - Remote Operation

    - Chapter 7 - X.21 Operation

    - Chapter 8 - X.25 Operation

- Part Four - Protocol

    - SNA Protocol

- Part Five - Network Management Tools

    - Response Time Monitor (RTM) Function

    - SNA Alert Function

- Part Six - Features

    - 3174 Token-Ring Support

- Appendices

    - Appendix A - Selector-Light-Pen Operation

    - Appendix B - Host Programming Considerations

- Appendix C - 3180 Display Station Model 1
- Appendix D - Support of Intelligent Printer Data Stream
- List of Abbreviations
- Glossary
- Index

A.2 IBM 3174 Subsystem Control Unit Site Planning Guide (GA23-0213)

This guide identifies the tasks involved in preparing for the installation of the 3174 Subsystem Control Unit and provides guidelines for setting up and organizing these tasks.

The guide is written for the person who plans and makes sure that everything is in place so that the hardware can be made operational when it arrives. It may be a person giving direction to and working with people at individual sites where the hardware is to be installed. It may be a person with a full-time job as a site planner, or site planning may be part of that persons job.

The manual is organized into six chapters and eight appendices.

- Chapter 1 - Introduction

  This contains a suggested checklist for site planning and discusses customer and IBM responsibilities in the site planning task.

- Chapter 2 - Subsystem Configurations

  This contains detailed information about subsystem configurations.

- Chapter 3 - Planning Subsystem Cabling

  This contains detailed information about subsystem cabling.

- Chapter 4 - Planning for Unit Placement and Device Cable Installation

  This contains the *Site Floor Planning Worksheet*, as well as completed examples of the *Worksheet* for both the floor and table-top versions of the 3174 control units. It also contains information about defining subsystem attachment and contains a description of the device and communication cable attachment procedures.

- Chapter 5 - Machine Specifications

  This contains specifications for the 3174 and the 3299 Terminal Multiplexer.

- Chapter 6 - Environmental and Safety Planning

  This contains information about environmental and safety planning.

- Appendix A - Specifications of Power Plug Types - U.S. and Canada

- Appendix B - Specifications of Power Plug Types - World Trade

- Appendix C - Inch to Millimeter unit conversions

- Appendix D - Voltage Limitations

- Appendix F - Direct Connection Attachment

- Appendix G - 3174 Cabling Worksheets

- Appendix H - 3174 Cabling Instructions

A.3 IBM 3174 Subsystem Control Unit Customizing Guide (GA23-0214)

This book explains how to customize the microcode for the 3174. It presents both the background information required for planning to customize and the step-by-step procedures for customizing the microcode on the Control diskette.

It is written for the person who customizes the microcode on the Control diskette for the 3274. In various businesses, different people do this job: system programmers, systems analysts, systems specialists, software specialists, communications analysts, operations analysts, network planners or telecommunications specialists. The person who customizes the control unit should be familiar with working at a 3270-type display station.

The book has three main parts and four appendices.

- Part 1. - First Time use

  This part explains what is involved in customizing the 3174 microcode for the 3174. Several approaches to record keeping are presented.

- Part 2. - Planning

  This part presents the planning information needed in order to customize the microcode. It explains how to record the customizing information for a particular control unit on each of the *Configuration Worksheets*.

- Part 3. - Procedures

  This part presents the step-by-step procedures for customizing the Control diskette, working at a display station typing in the information recorded previously on the *Configuration Worksheets*

- Appendices

  - Appendix A

    This list status codes, explanations and user responses.

  - Appendix B

    This identifies customizing keyboard and keypad layouts.

  - Appendix C

    This tells how to complete the 3174 Worksheets which will help in the keeping records.

  - Appendix D

    This provides the worksheets which when completed contain the information needed to customize 3174 control units. In order to always have an unused set of worksheets, you may want to reproduce them in quantity so that they are available for future planning.

A.4 IBM 3174 User's Guide

There are one 3174 User's guide for each group of models

- 1L, 1R, 2R, 3R User's Guide (GA23-0337)

- 51R, 52R, 53R User's Guide (GA23-0333)

- 81R, 82R, User's Guide (GA23-0313)

These books are written for anyone assigned to handle problems with the 3174 Control Unit. It should remain with the control unit so that the responsible people can refer to it when doing operating and problem determination procedures.

These manuals have four chapters and two appendixes.

- Chapter 1 - Introduction

- Chapter 2 - Operation

  This describes the location and function of the switches, indicators, ports and cables on the 3174.

  It also contains basic operating procedures, such as turning on power, loading microcode and displaying system menus.

- Chapter 3 - Problem Determination

  This contains a symptom list, test procedures, 3299 problem-handling procedures and status codes.

- Chapter 4 - Customer Setup

- Appendix A - Online Test Summary

  This contains a description of the 3174 Online tests

- Appendix B - Cable Connectors

A.5   IBM 3174 Help Desk Reference (GA23-0217)

This manual is intended for use when handling problems that may involve a 3174 unit or attached terminals. It is primarily for use at a customer's central help desk or for anyone at the control unit site who has first used the *3174 User's Guide* and wants to proceed further in diagnosing a problem.

The manual has seven Chapters

- Chapter 1 - Status Codes

  This is a listing of status codes and recommended actions.

- Chapter 2 - Online Tests

  This describes *online* tests and procedures.

- Chapter 3 - Offline Tests

  This describes *offline* tests and procedures.

- Chapter 4 - Offline Tests Procedures (Models 81R and 82R)

  This describes *offline* tests and procedures for models 81R and 82R.

- Chapter 5 - Reference Summary

  This contains a summary of commands, orders and attributes taken from the *3174 Functional Description*.

- Chapter 6 - SNA Alert Function

  This describes the SNA Alert Function and the related Network Problem Determination.

- Chapter 7 - Record Formatted Maintenance Statistic

  This describes four types of "Request Formatted Maintenance Statistics Formats". These statistics are recorded by the Network Communications Control Facility.

- Chapter 8 - Response Time Monitor

This describes the Response Time Monitor, logs and statistics.

A.6 IBM 3174 Maintenance Information

This manual contains information needed by the IBM Service representative to maintain the 3174 Control Unit. It should be kept with the control unit.

It consists of five chapters and four appendices.

- Chapter 1 - General Information

- Chapter 2 - Diagnostic Information

- Chapter 3 - Repair Information

- Chapter 4 - Installation

- Chapter 5 - Safety Inspection Guide

- Chapter 6 - Parts Catalogue

- Appendix A - Reference Information

- Appendix B - IBM Cabling System

- Appendix C - X.25 Feature

- Appendix D - X.21 Feature

A.7 IBM 3174 Feature Installation Instructions

These instructions describe how to install various 3174 features and verify that they are working correctly.

- 1.2MB Diskette Drive Customer Setup Instructions (GA23-0263)

- Terminal Multiplexer Adapter Customer Setup Instructions (GA23-0265)

- Encrypt/Decrypt Adapter Customer Setup Instructions (GA23-0262)

- Storage Expansion Customer Setup Instructions (GA23-0330)

- IBM Token-Ring 3270 Gateway Customer Setup Instructions (GA23-0329)

Appendix B. IBM 3174 Large Control Unit Card and Adapter Functions

The following is a description of the card and adapters that may be installed in various models of the IBM 3174 Subsystem Control Unit. It is useful to know the hardware group and recommended position of each card and adapter for problem determination purposes, so this information is also included.

Each card has a position in the 3174 logic board recommended by IBM. Apart from the Channel Adapter they can be thought of as conventional positions rather than mandatory. However conventions are always helpful if problems arise. The number of the position that a particular card should be fitted to is included in the installation instructions with each card.

Each of these cards is a Field Replaceable Unit (FRU) and as such each has a FRU type number.

B.1   Processor Card

- Use .... Base - All Models

- Type Number 9500

- Position 18

- Hardware Group 87

This card contains the control unit microprocessor, a timer, a pluggable 16K x 18 ROS module, and other timing and control logic. It also contains logic for single-bit per halfword memory error correction and double-bit memory error detection. A red light emitting diode (LED) on the card blinks during diagnostic testing to indicate that the card logic is operational.

B.2   512K Storage Card

- Use .... Optional - Models 1L, 1R, 2R

- Type Number 9051

- Position .... 19 or 20

- Hardware Group 87

This card contains 23 modules of 256K x 1 memory and switching logic to provide 512K of usable storage, six-bit error correction code, single-bit error correction, and double-bit error detection.

B.3   1.0M Storage Card

- Use .... Base - All Models; Optional - Models 1L, 1R, 2R

- Type Number 9052

- Position .... 19 or 20

- Hardware Group 87

This card contains 46 modules of 256K x 1 memory and switching logic to provide 1.0M of usable storage, six-bit error correction code, single-bit error correction, and double-bit error detection.

B.4   Disk Adapter (File Adapter)

- Use .... Base - All Models

- Type Number 9070

- Position 21

- Hardware Group 01

This adapter provides read/write control for the two diskette drives that can be installed in the control unit.

B.5   Terminal Adapter

- Use .... Base - All Models

- Type Number 9150

- Position .... 22 (1L) or 23 (1R & 2R)

- Hardware Group 26

This adapter provides buffering and control for attachment of up to 32 category-A displays, printers, and workstations. Each of the four BNC top-card connectors provides a path to one terminal, or to one IBM 3299 Terminal Multiplexer, or to one Terminal Multiplexer Adapter. Signals from each port contains addressing for up to eight terminals. Attachments can be up to 4920 feet (1.5 km) from the control unit when coaxial cable is used to attach them, or up to 3280 feet (1 km) when IBM Cabling System Data Grade Media is used. A balun is needed at the terminal end of the connection, but none is needed at the control unit end when Cabling System media is used. Diagnostic wrap capability, under microcode program control, is provided at the driver/receiver output. Logic for Driver/receiver wrapping, timeout delay selection, and addressed cable protocol are also included on the card.

B.6   Terminal Multiplexer Adapter

- Use .... Optional - All Models

- Type Number .... 9070 or 9072

- Position .... 15,16,12 and 23(L Models) or 11(R Models)

- Hardware Group 26

This adapter performs the same functions as an external IBM 3299 Model 2 Terminal Multiplexer. Input to the card is via a short length of RG-62A/U cable between a Terminal Adapter port and the top BNC connector on this card. The input signals contain addressing to select one of the eight possible BNC output driver/receiver ports. Terminals can be up to 4920 feet (1.5 km) from the control unit when coaxial cable is used to attach them, or up to 3280 feet (1 km) when IBM Cabling System Data Grade Media is used. A balun is needed at the terminal end of the connection, but none is needed at the control unit end when Cabling System media is used. Diagnostic wrap capability, under microcode program control, is provided at the driver/receiver output.

B.7 Channel Adapter

- Use .... Base - Model 1L

- Type Number 9210

- Position 11

- Hardware Group 16

This adapter provides S/370-type channel host communications. Attachment to selector, byte multiplexer, and block multiplexer channels is supported. SNA or non-SNA operational mode is selectable via microcode. When in SNA mode the 3174 operates as a single-address control unit. When in non-SNA mode the 3174 unit operates as a shared multiple address control unit, using one of two address ranges - one for up to 16 devices, and one for up to 32 devices. The channel address is selectable via microcode in both modes. The mode of data transfer two and from the channel, which is also microcode-selectable, may be either Data-Chain Interlocked or High-Speed Transfer.

B.8 Channel Interface Driver/Receiver Card

- Use .... Base - Model 1L

- Type Number 9230

- Position .... N/A (Fitted to position next to Bus and Tag)

- Hardware Group 16

This card is used in conjunction with the Channel Adapter. It provides driver/receiver signal conversion for the S/370-type bus and tag lines between the host channel and the Channel Adapter. The card also contains solid state Select Out bypass relays.

B.9 Type-1 Communications Adapter (V.24/V.35)

- Use .... Base - Model 1R

- Type Number 9253

- Position 22

- Hardware Group 11

This adapter provides CCITT V.24/V.28 (EIA RS-232C) and CCITT V.35 electrical interfaces to connect the control unit to a modem or other signal converter. A 25-pin D-shell connector is provided on the top of the card to connect the communications cable. Adapter logic works in byte-PIO mode when BSC protocols are used, and in byte-CHIO mode for other protocols. The desired interface (V.24/V.28 or V.35) and the operational speed are selected under microcode program control. External clocking is required.

B.10　Type-2 Communications Adapter (X.21)

- Use .... Base - Model 2R

- Type Number 9273

- Position 22

- Hardware Group 11

This adapter provides CCITT V.11 (X.21) electrical interface to connect the control unit to an X.21 network or other signal converter providing a compatible interface. A 25-pin D-shell connector is provided on the top of the card to connect the communications cable. Adapter logic works in byte-CHIO mode supporting SNA/SDLC protocols. The operational speed is selected under microcode program control. External clocking is required.

B.11　Type-3 Communications Adapter (IBM Token Ring)

- Use .... Base - Model 3R

- Type Number 9350

- Position .... 11 (Model 3R), 12 (Model 1L)

- Hardware Group 11

This adapter provides an IEEE 802.5 (ECMA 89) standard interface to an IBM Token-Ring Network. Baseband communications at 4M bps is supported. The adapter contains a microprocessor, memory, ROS, and other logic to provide the physical interface, link clocking, serialization/deserialization, link address recognition, frame structuring/stripping, and error checking. A nine-pin connector is provided to attach the communications cable.

B.12　Asynchronous Emulation Adapter

- Use .... Optional - All Models

- Type Number 9331

- Position 14,13,12

- Hardware Group 21,22,23

This adapter provides eight ASCII start/stop ports. The adapter contains a microprocessor and memory, which is loaded from a feature DASD. A short cable between the control unit mother board and a panel containing eight 25-pin D-shell connectors carries signals to and from the adapter. The adapter performs protocol conversion to allow certain ASCII devices to communicate with IBM hosts, and certain IBM terminals to communicate with ASCII hosts. The EIA RS-232C interface is selected under microcode program control.

B.13 Encrypt/Decrypt Adapter

- Use .... Optional - Models 1R, 2R, 3R

- Type Number 9030

- Position 24

- Hardware Group 46

This adapter provides the logic to encrypt and decrypt data traffic between SNA nodes according to the United States National Bureau of Standards Data Encryption (DES) algorithm. (Encryption is not available to terminals operating in DFT mode.) The card contains a 4.14V mercury battery, oscillator, control logic, storage for the crypto master key, and a security keylock to prevent unauthorized access to the adapter.

Appendix C. 3174 Customization for Token-Ring Network

The following panels show customization examples. The first example describes a local channel attached 3174-01L in SNA mode serving as a Token Ring gateway. The second example describes a Token Ring attached 3174-03R acting as a downstream PU for either type of gateway.

C.1 Customization Example for the 3174-01L Gateway

```
_____ Model / Attach _____



      099 — 3174 TOKEN RING GATEWAY    ADDR 4000 2330 1001

      100 — 01L

      101 — 5








         PF3=QUIT                         8=FWD
```

```
 _____ Local (SNA) _____


   104 - 40          105 - 45          108 - 23A0156     116 - 2

   121 - 01          125 - 01100000    127 - 5 2

   132 - 0 0 0 0     136 - 1 1 1 1     137 - 0 0 0 0     138 - 0

   141 - A           165 - 0           166 - A

   173 - 10100001 175 -

   213 - 1           215 - 3174C       220 - 3

   222 - 1           223 - 10          224 - 2           225 - 7




      PF3=QUIT    4=DEFAULT    7=BACK    8=FWD
```

```
 _____Token-Ring Gateway_____


   900 - 4000 2330 1001    905 - 1    908 - RING01










      PF3=QUIT    4=DEFAULT    7=BACK    8=FWD    9=RTNH
```

```
_____ 940: Ring Address Assignment _____


S@        Ring@         SAP@  T  |  S@        Ring@         SAP@  T

40    4000 2330 1001     04      |
41    4000 4330 1002     04   1  |  42    4000 4330 1003     04   1
43    4000 3330 1004     04   0  |  44    4000 5330 1005     04   1
45    4000 5330 1006     04   1  |




                PF3=QUIT    4=DEFAULT    7=BACK    8=FWD    9=RTNH
```

```
_____ 941:  Ring Transmission Definition _____


S@        Ring@         SAP@  F  W  |  S@        Ring@         SAP@  F  W

40    4000 2330 1001     04         |
41    4000 4330 1002     04   3  2  |  42    4000 4330 1003     04   3  2
43    4000 3330 1004     04   0  1  |  44    4000 5330 1005     04   3  2
45    4000 5330 1006     04   3  2  |




                PF3=QUIT    4=DEFAULT    7=BACK    8=FWD    9=RTNH
```

C.2 Customization Example for the 3174-03R/53R DSPU

```
_____ Model / Attach _____




   099 - GATEWAY IS 3174 01L    ADDR 4000 2330 1001

   100 - 03R

   101 - 7













        PF3=QUIT                          8=FWD
```

```
_____ Token-Ring Network _____
   106 - 4000 4330 1002   107 - 4000 2330 1001   108 - 23A0208   116 - 2

   121 - 01               125 - 01100000         127 - 5 2

   132 - 0 0 0 0          136 - 1 1 1 1          137 - 0 0 0 0   138 - 0

   141 - A               165 - 0                166 - A

   173 - 10100001        175 -

   213 - 1               215 - A0001            220 - 3

   380 - 2042            381 - 2                382 - 0521      383 - 2


   PF3=QUIT    4=DEFAULT    7=BACK    8=FWD
```

Appendix D. VTAM APARs for the 3174 GATEWAY

The following lists of APARs describe VTAM related problems that can occur when running the 'IBM Token-Ring Network 3270 Gateway' feature on an IBM 3174 Model 1L. The APAR lists are categorized by operating system and VTAM level. The program fix for these problems must be applied when installing the feature. Contact the IBM Support Center to obtain the appropriate fix for your environment.

CHANNEL RELATED VTAM PROBLEMS

SYSTEM/VTAM LEVEL	APAR	COMMENTS
MVS/VTAM 2.1	OY02441	605I MSG at console on CONNECT-IN.
MVS/VTAM 2.2	OY02441	605I MSG at console on CONNECT-IN.
	OY03563	Connect-Disconnect loop.
MVS/370/VTAM 3.1	OY02796	Lost "CONNECT-IN" ... no MSG.
	OY02763	605I MSG at console on CONNECT-IN.
	OY03568	Connect-Disconnect loop.
MVS/370/VTAM 3.1.1	OY02796	Lost "CONNECT-IN" ... no MSG.
	OY02763	6051 MSG at console on CONNECT-IN
	OY03568	Connect-Disconnect loop.
MVS/XA/VTAM 3.1	OY02761	Lost "CONNECT-IN" ... no MSG.
	OY02762	MSG at console on CONNECT-IN.
	OY03567	Connect-Disconnect loop.
MVS/XA/VTAM 3.1.1	OY02761	Lost "CONNECT-IN" ... no MSG.
	OY02762	605I MSG at console on CONNECT-IN.
	OY03567	Connect-Disconnect loop.
VM/VTAM 3.1.1	VM27218	Lost "CONNECT-IN" ... no MSG.
	VM27263	Connect-Disconnect loop.
VSE/VTAM 3.1	DY36460	Lost "CONNECT-IN" ... no MSG.
	DY36372	Connect-Disconnect loop.

ALERTS RELATED VTAM PROBLEMS

SYSTEM/VTAM LEVEL	APAR	COMMENTS
MVS/370/VTAM 3.1	OZ97610	NPDA picture incorrect for loc cnt
	OY02866	NPDA/NLDM RECFMS hangs
MVS/370/VTAM 3.1.1	OZ97610	NPDA picture incorrect for loc cnt
	OY02866	NPDA/NLDM RECFMS hangs
MVS/XA/VTAM 3.1	OZ97323	NPDA picture incorrect for loc cnt
	OY03072	NPDA/NLDM RECFMS hangs
MVS/XA/VTAM 3.1.1	OZ97323	NPDA picture incorrect for loc cnt
	OY03072	NPDA/NLDM RECFMS hangs
VM/VTAM 3.1	VM26515	NPDA/NLDM RECFMS hangs
VM/VTAM 3.1.1	VM26700	NPDA picture incorrect for loc cnt
	VM26515	NPDA/NLDM RECFMS hangs
VSE/VTAM 3.1	DY35804	NPDA picture incorrect for loc cnt
	DY36276	NPDA/NLDM RECFMS hangs
VSE/VTAM 2.1	DY35968	NPDA/NLDM RECFMS hangs

OTHER VTAM RELATED PROBLEMS

SYSTEM/VTAM LEVEL	APAR	COMMENTS
MVS/370/VTAM 3.1	OY00747	Corrupted data on READ.
MVS/370/VTAM 3.1.1	OY00747	Corrupted data on READ.
MVS/XA/VTAM 3.1	OZ97661	Corrupted data on READ.
MVS/XA/VTAM 3.1.1	OZ97661	Corrupted data on READ.
VM/VTAM 3.1.1	VM26630	Corrupted data on READ.
VSE/VTAM 3.1	DY36136	Corrupted data on READ.

Appendix E. Examples of 3174 VTAM/NCP Definitions

This appendix contains VTAM and NCP definition examples for local channel attached SNA- and non-SNA-3270 devices as for devices attached to a SDLC link, to an X.25 connection and to the Token-Ring Network.

E.1 Local 3174 Definitions (SNA)

PU DEFINITION

```
*------------------------------------------------------------------*
*          LOCAL 3174 DEFINITIONS                                  *
*------------------------------------------------------------------*
LOCCOLOR VBUILD   TYPE=LOCAL
LOCAPU   PU       CUADDR=05E,ISTATUS=ACTIVE,PUTYPE=2,MAXBFRU=10,    *
                  MODETAB=MT327X


LU  DEFINITION

LOC791   LU       LOCADDR=2,VPACING=4,DLOGMOD=T3279M3,USSTAB=US327X
LOC32872 LU       LOCADDR=3,VPACING=4,DLOGMOD=T3287M2C
LOC793   LU       LOCADDR=4,VPACING=4,DLOGMOD=T3279M2,USSTAB=US327X
LOC794   LU       LOCADDR=5,VPACING=4,DLOGMOD=T3279M2,USSTAB=US327X
LOC795   LU       LOCADDR=6,VPACING=4,DLOGMOD=T3279M4E,USSTAB=US327X
LOC32876 LU       LOCADDR=7,VPACING=4,DLOGMOD=T3287M2C,USSTAB=US327X
LOC32877 LU       LOCADDR=8,VPACING=4,DLOGMOD=T3287M2C
LOC798   LU       LOCADDR=9,VPACING=4,DLOGMOD=T3279M4,USSTAB=US327X
```

Note: The ACF/VTAM Installation manual describes the definition of Local SNA major nodes.

E.2   Local 3174 Terminal Definition (Non-SNA)

```
**********************************************************************
*                                                                    *
*   LOCAL 3270 TERMINAL DEFINITION                                   *
*                                                                    *
**********************************************************************

          LBUILD
H11L420   LOCAL CUADDR=420,TERM=3277,                                X
                MODETAB=AMODETAB,LOGAPPL=SAMON11,USSTAB=US3270,      X
                ISTATUS=ACTIVE,SPAN=(SPH11L),DLOGMOD=M2BSCNQ
*               STATOPT=('3277 420 -SYS3')
H11L421   LOCAL CUADDR=421,TERM=3277,                                X
                MODETAB=AMODETAB,LOGAPPL=SAMON11,USSTAB=US3270,      X
                ISTATUS=ACTIVE,SPAN=(SPH11L),DLOGMOD=M2BSCNQ
*               STATOPT=('3277 421 -SYS3')
.
.
.

H11L42F   LOCAL CUADDR=42F,TERM=3286,FEATUR2=(MODEL2),               X
                MODETAB=AMODETAB,ISTATUS=INACTIVE,                   X
                SPAN=(SPH11L)
*               STATOPT=('3286 42F -SYS3')
H11L430   LOCAL CUADDR=430,TERM=3277,                                X
                MODETAB=AMODETAB,USSTAB=US3270,LOGAPPL=SAMON11,      X
                ISTATUS=ACTIVE,SPAN=(SPH11L),DLOGMOD=M3BSCQ
*               STATOPT=('3277 430 -SYS3')
H11L431   LOCAL CUADDR=431,TERM=3277,                                X
                MODETAB=AMODETAB,USSTAB=US3270,LOGAPPL=SAMON11,      X
                ISTATUS=ACTIVE,SPAN=(SPH11L),DLOGMOD=M3BSCQ
*               STATOPT=('3277 431 -SYS3')
H11L436   LOCAL CUADDR=436,TERM=3277,                                X
                MODETAB=AMODETAB,USSTAB=US3270,DLOGMOD=M3BSCNQ,      X
                ISTATUS=ACTIVE,SPAN=(SPH11L)
*               STATOPT=('3277 436 -SYS3')
H11L437   LOCAL CUADDR=437,TERM=3277,                                X
                MODETAB=AMODETAB,USSTAB=US3270,DLOGMOD=M3BSCNQ,      X
                ISTATUS=ACTIVE,SPAN=(SPH11L)
*               STATOPT=('3277 437 -SYS3')
.
.
.
```

Note: The ACF/VTAM Installation manual describes the definition and filing of local terminals.

E.3 SDLC 3174 Definitions

E.3.1 SDLC Group Specification for 3174

GDSL   (definition model)

```
****************************************************************************
*          GROUP MACRO SPECIFICATIONS FOR SDLC LINES                      *
****************************************************************************
G13S1     GROUP LNCTL=SDLC,        SYNCHRONOUS DATA LINK              X
                DUPLEX=FULL,        REQUEST TO SEND ALWAYS UP          X
                NRZI=YES,                                              X
                REPLYTO=1,          1 SECOND FOR SDLC                  X
                RETRIES=(7,4,5),    7 RETRIES PER SECOND FOR 5 TIMES   X
                TYPE=NCP            NCP ONLY
****************************************************************************
```

E.3.2 Line Macro for SDLC 3174

LSD3174   (definition model)

```
****************************************************************************
*              SDLC 3174                                                  *
****************************************************************************
*          LINE MACRO SPECIFICATION    SDLC LINK 000   MODEM              *
****************************************************************************
L13000    LINE  ADDRESS=(000,FULL),  FULL DUPLEX                      X
                ATTACH=MODEM,        MODEM  ATTACH                     X
                OWNER=M11,                                             X
                ANS=CONTINUE,        DON'T BREAK CROSS DOMAIN SESSIONS X
                CLOCKNG=EXT,         MODEM ATTACHED                    X
                NRZI=YES,                                              X
                ISTATUS=ACTIVE,                                        X
                DUPLEX=(FULL),       REQUEST TO SEND ALWAYS UP         X
                ETRATIO=30,          DEFAULT                           X
                MAXPU=1,             ALLOW NO MORE THAN 1 PU  ON LINE  X
                SERVLIM=10,                                            X
                SRT=(,64),                                             X
                SPEED=9600
*               STATOPT='3174 LINE'
```

E.3.3 SDLC Service Macro Specifications Remote 3174

SERVICE   (definition model)

```
****************************************************************************
*          SERVICE MACRO SPECIFICATION FOR SDLC (LINE 000)                *
****************************************************************************
          SERVICE ORDER=(P13000A),                                   X
                  MAXLIST=1
```

E.3.4   3174 PU/LU Specifications for PU3174

CBS3174   (definition model)

```
****************************************************************
*         PU/LU SPECIFICATIONS FOR PU3174                    *
****************************************************************
P13000A  PU      ADDR=C1,              CLUSTER ADDRESS = C1         X
                 MAXDATA=265,          MAXIMUM AMOUNT OF DATA       X
                 MAXLU=64,             MAXIMUM LUS ON THIS PU       X
                 MAXOUT=7,             MAX SDLC FRAMES BEFORE RESPONSE X
                 PACING=0,             PACING SET BY BIND IMAGE     X
                 PASSLIM=8,                                         X
                 PUDR=YES,                                          X
                 PUTYPE=2,                                          X
                 RETRIES=(,4,5),       7 RETRIES PER SECOND FOR 5 TIMES X
                 DISCNT=(NO),          (V) VTAM                     X
                 ISTATUS=ACTIVE,       (V) VTAM                     X
                 VPACING=0             (V) VTAM
T1300002 LU      LOCADDR=02,           3278                         X
                 MODETAB=AMODETAB,                                  X
                 DLOGMOD=M2SDLCNQ,                                  X
                 ISTATUS=ACTIVE        (V) VTAM
*
T1300003 LU      LOCADDR=03,           3278                         X
                 MODETAB=AMODETAB,                                  X
                 DLOGMOD=M2SDLCNQ,                                  X
                 ISTATUS=ACTIVE        (V) VTAM
*
T1300004 LU      LOCADDR=04,           3287                         X
                 MODETAB=AMODETAB,                                  X
                 DLOGMOD=M3287SCS,                                  X
                 ISTATUS=ACTIVE        (V) VTAM
*
T1300005 LU      LOCADDR=05,           3179G                        X
                 MODETAB=AMODETAB,                                  X
                 DLOGMOD=M2SDLCNQ,                                  X
                 ISTATUS=ACTIVE        (V) VTAM
*
T1300006 LU      LOCADDR=06,           3270PC                       X
                 MODETAB=MTPSPC,                                    X
                 DLOGMOD=PCMODE,                                    X
                 ISTATUS=ACTIVE        (V) VTAM
*
T1300007 LU      LOCADDR=07,           3270PC                       X
                 MODETAB=MTPSPC,                                    X
                 DLOGMOD=PCMODE,                                    X
                 ISTATUS=ACTIVE        (V) VTAM
*
T1300008 LU      LOCADDR=08,           3270PC                       X
                 MODETAB=MTPSPC,                                    X
                 DLOGMOD=PCMODE,                                    X
                 ISTATUS=ACTIVE        (V) VTAM
*
```

E.4 X.25 Definitions

This section contains VTAM and NPSI Release 4.2 definitions that were used in testing various functions of 3174.

```
*******************************************************************
* X25 NPSI R 4.2 STAGE1 INPUT                                     *
*                                                                 *
* THIS GENERATION IS FOR 1 MCH LINK.                             *
* FOR:                                                            *
*                                                                 *
* CPU TO 3174  PVC  AND SVC; WITH QLLC CONTROL FOR BOTH.         *
*                                                                 *
*       X25BUILD - THIS MACRO DESCRIBES THE GENERATION PROCESS.  *
*                                                                 *
*******************************************************************
X25R41 X25BUILD IDNUMH=01,      ID FOR NON-SNA SWITCHED SUPPORT        C
                MAXPIU=4K,      MAXIMUM PIU LENGTH                     C
                MCHCNT=1,       1 MCH LINK DEFINED                     C
                MODEL=3725,     3725                                   C
                SNAP=NO,        SNAP FACILITY OFF                      C
                SRCHI=X25BLK1,  STAGE 2 OUTPUT MEMBER NAME (1 = GENNO)C
                SRCLO=X25TBL1,  STAGE 2 OUTPUT MEMBER NAME (1 = GENNO)C
                SRCPRFX=X25,    STAGE 2 OUTPUT TABLES & BLOCKS PREFIX C
                VERSION=V4,     NPSI RELEASE 4.2 ONLY                  C
                TYPSYS=OS       MVS 3.8 WITH ACF/VTAM V3
*******************************************************************
*       X25 NET - DESCRIBES THE PPSN.                            *
*******************************************************************
NETX25 X25NET  DM=YES,         LAPB DM COMMAND                        C
               NETTYPE=1,      TYPE 1 TYMNET NETWORK                  C
               CPHINDX=2,      2 ENTRIES IN VIRTUAL CIRCUIT TABLE     C
               OUHINDX=1       1 ENTRY IN THE OPTIONAL FACILITY TABLE
*******************************************************************
*    X25VCCPT - VIRTUAL CIRCUIT CONNECTION PARAMETERS TABLE.     *
*******************************************************************
       X25VCCPT INDEX=1,       TABLE ENTRY NUMBER                     C
                MAXPKTL=128,   MAXIMUM PACKET LENGTH EXCL PACKET HDR C
                INSLOW=(25,0), FREE BUFFER PERCENTAGE                 C
                VWINDOW=2      PACKET TRANSMIT/RECEIVE WINDOW SIZE
*******************************************************************
*    X25OUFTT - SVC USER FACILITIES AND CALL USER DATA TABLE.    *
*******************************************************************
       X25OUFT INDEX=1         TABLE ENTRY NUMBER                     *
*******************************************************************
*     X25MCH - DESCRIBE THE PHYSICAL MULTICHANNEL LINK.          *
*             DTE END 15                                          *
*******************************************************************
       X25MCH ADDRESS=15,      3725  FDX LINE ADDRESS                 C
              FRMLGTH=259,     MAXIMUM FRAME LENGTH (+3 BYTE PKT HDR)C
              LCGDEF=0(20),    LOGICAL CHAN GRP 0, UP TO CHAN 12      C
              MWINDOW=7,       LINK ACCESS FRAME WINDOW SIZE (HDLC)   C
```

```
              ANS=STOP,            AUTO NETWORK SHUTDOWN DECISION          C
              ENABLTO=3,           ENABLE TO 3 SECONDS                     C
              DSABLTO=3,           DISABLE TO 3 SECONDS                    C
              DBIT=NO,             DELIVERY CONFIRMATION BIT SUPPORTED     C
              GATE=NO,             GATE OR DATE FUNCTION SUPPORTED         C
              SUBADDR=NO,          SUBADDRESING                           C
              LCN0=NOTUSED,        LOGICAL CHANNEL 0 NOT USED              C
              LLCLIST=(LLC3),         SVC'S TYPES SUPPORTED                C
              NDRETRY=2,           NP/TP SEQUENCE EXECUTED                 C
              NPRETRY=10,          I OR U FRAME TIMOUT RECOVERY            C
              PAD=INTEG,           PAD FUNCTION       SUPPORTED           C
              TRAN=ODD,            NO TRANSLATION IF NO PAD FUNCTION       C
              PKTMODL=8,           MODULO 8 PACKET NUMBERING               C
              STATION=DTE,         NETWORK CONNECTION                      C
              SPEED=9600,          PHYSICAL LINK SPEED                     C
              TDTIMER=2,           TIME (SECS) BETWEEN ND RETRANSMISSIONSC
              TPTIMER=3.0          X25 T1 TIMER IN SECS
*****************************************************************************
*      X25LCG - DESCRIBE THE LOGICAL CHANNEL GROUP.                   *
*****************************************************************************
         X25LCG LCGN=0            LOGICAL CHANNEL GROUP NUMBER
*****************************************************************************
*     PU/LU MACRO SPECIFICATION FOR 3174 LOGICAL CHANNEL 4 (PVC)       *
*****************************************************************************
XL15004   X25LINE LCN=1,                                                  C
              DSTNODE=BNN,                                                C
              LLC=LLC3,                                                   C
              TYPE=P,                                                     C
              VCCINDX=1
*
XP15004 X25PU   PUTYPE=2,         ATTACH TO AN X.25/SNA 3174              C
              ADDR=C1,            STATION ADDRESS                         C
              MAXDATA=265,        DEPENDANT ON PU CONSTRAINTS             C
              PASSLIM=7,          MAXIMUM PIU SEGMENTS IN TRANSMISSION    C
              MAXOUT=7,           MAXIMUM SDLC FRAMES BEFORE LINK RESP    C
              ISTATUS=ACTIVE,     ACTIVATE AT INITIALISATION              C
              SSCPFM=USSSCS,      LOGON FORMAT                            C
              MODETAB=MT3274C2,   MODE TABLE REFERENCE FOR VTAM           C
              DLOGMOD=T3278M2,    MODE TABLE REFERENCE FOR VTAM           C
              USSTAB=US327X       USS TABLE REFERENCE FOR VTAM
*
XT1541    X25LU LOCADDR=2,        ADDRESS OF LU                           C
              ISTATUS=ACTIVE      ACTIVATE WITH PU
XT1542    X25LU LOCADDR=3,        ADDRESS OF LU                           C
              ISTATUS=INACTIVE    ACTIVATE WITH PU
*****************************************************************************
*      X25VC - DESCRIBE RESERVE PVCS                                  *
*****************************************************************************
         X25VC  LCN=(2,10),       LoGICAL CHANNELS WITHIN A GROUP         C
              TYPE=P,             V C TYPE - P=PERMANENT, S=SWITCHED       C
              VCCINDX=1,          INDEX IN CONNECTION PARAMETER TABLE      C
              LLC=LLC0            LOGICAL LINK CONTROL
*****************************************************************************
*      X25VC - DESCRIBE THE SWITHED VIRTUAL CIRCUITS                  *
*****************************************************************************
```

```
         X25VC  LCN=(11,20),        LOGICAL CHANNELS WITHIN A GROUP       C
                NCPGRP=X25S01B,     TO ASSOCIATE WITH VTAM PATH STMT      C
                TYPE=S,             V C TYPE - P=PERMANENT, S=SWITCHED    C
                VCCINDX=1,          INDEX IN CONNECTION PARAMETER TABLE   C
                CALL=INOUT,         INCOMING AND OUTGOING CALLS ACCEPTED  C
                OUFINDX=1           INDEX IN USER TABLE
*****************************************************************************
*      X25END - NPSI GENERATION END, NAME MEMBERS FOR STAGE 2 OUTPUT.*
*****************************************************************************
         X25END INCPRFX=X25,        STAGE 2 OUTPUT MEMBERS PREFIX         C
                LSTUACB=YES,        NPSI SUPPLY LASTUACB MACRO            C
                NCPSTG1=X25NCP1,    STAGE 2 OUTPUT MEMBER NAME (1 = GENNO)C
                X25VTAM=YES,        VTAM ACCEPT ADDRESS=NONE & AUTO=YES   C
                INCHI=X25HJI1,      STAGE 2 OUTPUT MEMBER NAME (1 = GENNO)C
                INCL2HI=X25HII1,    STAGE 2 OUTPUT MEMBER NAME (1 = GENNO)C
                INCINIT=X25INI1,    STAGE 2 OUTPUT MEMBER NAME (1 = GENNO)C
                INCL2LO=X25LOI1,    STAGE 2 OUTPUT MEMBER NAME (1 = GENNO)C
                ORDINIT=X25INO1,    STAGE 2 OUTPUT MEMBER NAME (1 = GENNO)C
                ORDHI=X25HJO1,      STAGE 2 OUTPUT MEMBER NAME (1 = GENNO)C
                ORDL2HI=X25HIO1,    STAGE 2 OUTPUT MEMBER NAME (1 = GENNO)C
                ORDL2LO=X25L1       STAGE 2 OUTPUT MEMBER NAME (1 = GENNO)
         END
*****************************************************************************
```

┌───┐
│ In an ACF/VTAM switched major node: │
└───┘

```
X3174    VBUILD MAXGRP=5,                REQUIRED                      X
                MAXNO=12,               REQUIRED                      X
                TYPE=SWNET              REQUIRED
*
XP3174   PU     ADDR=C1,                                              X
                IDBLK=017,              Same as 3274                  X
                IDNUM=A0076,            user defined                  X
                DISCNT=YES,                                           X
                MAXDATA=265,                                          X
                MAXOUT=7,                                             X
                PASSLIM=7,                                            X
                MODETAB=MT3274C2,                                     X
                MAXPATH=6,                                            X
                VPACING=0,                                            X
                PUTYPE=2,                                             X
                SSCPFM=USSSCS,                                        X
                DLOGMOD=T3278M2,                                      X
                USSTAB=US327X
*
PAT3174  PATH   DIALNO=31060019833,     Host DTE address, LLC type 3  X
                GRPNM=X25S01B,          association to NCP/NPSI group  X
                GID=2,                                                X
                PID=21
*
XT3174   LU     LOCADDR=2
XT3174A  LU     LOCADDR=3
```

E.5 Definitions for 3174 Token-Ring Network Models

E.5.1 VTAM Definitions for 3174-03R/53R DSPU

VTAM definitions used for a Switched Major Node for a downstream 3174-03R.

```
*********************************************************************
*                                                                 *
*          VTAM SWITCHED MAJOR NODE FOR NTRI WITH 3174            *
*                                                                 *
*********************************************************************
E13SW9   VBUILD MAXGRP=5,                 REQUIRED                  X
                MAXNO=12,                 REQUIRED                  X
                TYPE=SWNET                REQUIRED
**
E13PS09  PU     ADDR=13,                 COULD BE ANYTHING (NOT USED) X
                IDBLK=017,               3274/3174 BURNED IN        X
                IDNUM=A0001,             SEE CUSTOMIZATION # 215    X
                DISCNT=NO,                                          X
                MAXOUT=1,                                           X
                MODETAB=AMODETAB,                                   X
                MAXPATH=2,                                          X
                VPACING=0,                                          X
                PUTYPE=2,                                           X
                SSCPFM=USSSCS,                                      X
                DLOGMOD=M2SDLCQ,                                    X
                USSTAB=US327X
**
E13D0901 PATH   DIALNO=0004400043301002,  TO 3174 MODEL 03R        X
                GRPNM=EG22L01,            LOGICAL GROUP OF TIC 1    X
                GID=1,                                              X
                PID=1
**
E13D0902 PATH   DIALNO=0004400033301004;  TO PC WITH 3270 EMULATION X
                GRPNM=EG22L02,            LOGICAL GROUP OF TIC 2    X
                GID=1,                                              X
                PID=2,                                              X
                USE=NO                    INITIALY INACTIV
**
E13L0902 LU     LOCADDR=2                 FOR A DISPLAY
E13L0903 LU     LOCADDR=3                 FOR A DISPLAY/PRINTER
E13L0904 LU     LOCADDR=4                 FOR A DISPLAY/PRINTER
                -
                -
                -
*********************************************************************
```

E.5.2 NCP Definitions for 3174 DSPU

NCP definitions for a 3720 - 3174 DSPU

```
*****************************************************************
G22XLLL   GROUP LNCTL=SDLC,REPLYTO=1
*****************************************************************
L22000    LINE  ADDRESS=(00,FULL),  LINE ADDRESS               X
                ATTACH=DIR3725,     INN LINK                    X
                CLOCKNG=EXT,        REQUIRED FOR DIRECT         X
                DUPLEX=FULL,        MODEM STRAPPING IS FULL     X
                MONLINK=YES,        MONITOR LINK FOR ACTPU      X
                NRZI=YES,                                       X
                PAUSE=0.1,                                      X
                SDLCST=(SDL22PRI,SDL22SEC),                     X
                RETRIES=(7,3,5),                                X
                SERVLIM=254,                                    X
                ISTATUS=ACTIVE      INITIAL STATUS
*****************************************************************
*         PU MACRO SPECIFICATION FOR THE ADJACENT 3720  SA12   *
*****************************************************************
P22000    PU    MAXOUT=7,           MAX PIU'S SENT BEFORE RESP REQ  X
                PUTYPE=4,           PHYSICAL UNIT TYPE LOCAL 3720   X
                ISTATUS=ACTIVE,     INITIAL STATUS                  X
                TGN=8,              TRANSMISSION GROUP 8            X
                ANS=CONTINUE        DON'T BREAK THE X-DOMAIN SESSIONS
*****************************************************************
*         PHYSICAL·GROUP FOR TIC 1                             *
*****************************************************************
EG22P01   GROUP ECLTYPE=PHYSICAL,   TIC DEFINITION             X
                PUDR=NO,                                        X
                STATOPT='NTRI TIC1'
EL22017   LINE  ADDRESS=(17,FULL),  TIC ADDRESS                X
                PORTADD=0,          FIRST  TIC                 X
                LOCADD=400012201001, LOCAL ADMIN. ADDRESS OF TIC  X
                RCVBUFC=4095,       NTRI RECEIVE BUFFER        X
                MAXTSL=1108         NTRI TRANSMIT DATA CAPACITY
EP22017   PU    ADDR=01
EU22017   LU    ISTATUS=INACTIVE,                              X
                LOCADDR=0
*****************************************************************
*         LOGICAL  GROUP FOR TIC 1                             *
*****************************************************************
EG22L01   GROUP ECLTYPE=LOGICAL,    DEFINE TERMINALS IN THE RING  X
                AUTOGEN=20,         LOGICAL CONNECTIONS        X
                MAXLU=20,           NUMBER OF LOGICAL UNITS    X
                PHYPORT=0,          FIRST  TIC                 X
                CALL=INOUT,         DIAL IN / DIAL OUT POSSIBILITY  X
                DIAL=YES,                                       X
                LINEADD=YES,                                    X
                LINEAUT=YES,                                    X
                MAXPU=1,                                        X
                PUTYPE=2
*****************************************************************
```

E.5.3 VSE/VTAM Definitions

The following is an example of a typical VSE/VTAM B-book for a local SNA Major Node containing a Gateway and two DSPUs.

```
CATALOG SNA3174.B
SNA3174  VBUILD TYPE=LOCAL

SNAE40    PU    CUADDR=E40,MODETAB=MODE3290,                GATEWAY      X
                PUTYPE=2,ISTATUS=ACTIVE,MAXBFRU=1
VSE3L000  LU    LOCADDR=2,                                               X
                SSCPFM=USSSCS,USSTAB=USSTAB,PACING=1,VPACING=2,          X
                ISTATUS=ACTIVE,LOGAPPL=MWTC,DLOGMOD=GMOD3E
VSE3L001  LU    LOCADDR=3,                                               X
                SSCPFM=USSSCS,USSTAB=USSTAB,PACING=1,VPACING=2,          X
                ISTATUS=ACTIVE,LOGAPPL=MWTC,DLOGMOD=GMOD3E
          LU    ...


SNAE41    PU    CUADDR=E41,MODETAB=MODE3290,                DSPU 1       X
                PUTYPE=2,ISTATUS=ACTIVE,MAXBFRU=1
VSE3L100  LU    LOCADDR=2,                                               X
                SSCPFM=USSSCS,USSTAB=USSTAB,PACING=1,VPACING=2,          X
                ISTATUS=ACTIVE,LOGAPPL=MWTC,DLOGMOD=GMOD3E
VSE3L101  LU    LOCADDR=3,                                               X
                SSCPFM=USSSCS,USSTAB=USSTAB,PACING=1,VPACING=2,          X
                ISTATUS=ACTIVE,LOGAPPL=MWTC,DLOGMOD=GMOD3E
          LU    ...


SNAE42    PU    CUADDR=E42,MODETAB=MODE3290,                DSPU 2       X
                PUTYPE=2,ISTATUS=ACTIVE,MAXBFRU=1
VSE3L200  LU    LOCADDR=2,                                               X
                SSCPFM=USSSCS,USSTAB=USSTAB,PACING=1,VPACING=2,          X
                ISTATUS=ACTIVE,LOGAPPL=MWTC,DLOGMOD=GMOD3E
VSE3L201  LU    LOCADDR=3,                                               X
                SSCPFM=USSSCS,USSTAB=USSTAB,PACING=1,VPACING=2,          X
                ISTATUS=ACTIVE,LOGAPPL=MWTC,DLOGMOD=GMOD3E
          LU    ...
```

Appendix F. Miscellaneous

F.1   3174 Physical Specifications

F.1.1   3174 Large Cluster Models 1L, 1R, 2R and 3R

- Width: 27.5 in.(698mm)
- Depth: 18.0 in.(457mm)
- Height: 25.5 in.(648mm)
- Weight: 110.0lbs.(50.0kg) approximately.
- Heat output: 1280 BTU/Hr.
- Power Consumption: 375 W (0.6KVA)
- Power Supply: 240V, single phase, 50HZ

F.1.2   3174 Medium Cluster Models 51R, 52R and 53R

- Width: 17.5 in.(444mm)
- Depth: 20.0 in.(508mm)
- Height: 7.8 in.(199mm)
- Weight: 62.0lbs.(28.2kg) approximately
- Heat output: 631 BTU/Hr.
- Power Consumption: 185 W (0.4KVA)
- Power Supply: 240V, single phase, 50HZ

F.1.3   3174 Small Cluster Models 81R, and 82R

- Width: 16.0 in.(406mm)
- Depth: 16.7 in.(425mm)
- Height: 4.7 in.(120mm)
- Weight: 18.0 lbs.(8.0kg)
- Heat output: 265 BTU/Hr.
- Power Consumption: 0.12KVA @ 60 Hz, 0.14KVA @ 50 Hz

F.2 How to select a PATCH.

Following a detailed procedure for activate microcode Patch is provided.

Start out the same way you would in order to customize:

1. Insert the Utility diskette into drive 1.

2. Insert the Control diskette into the drive 2.

3. Execute an ALT1 IML procedure and set the control to the terminal attached to port 0.

4. Choose option 1, Customize The Control Diskette. You are prompted to verify the drive selection: press Enter. You are prompted to ensure the Control diskette is in: press Enter. After a minute or so, the display will show the Customize Control Diskette menu.

5. Select option P (enter P where the cursor is and hit Enter). The Patches panel appears, listing the available Patches. Locate the one you want. There is a number (2 or 3) in front of it. Change that number to 1.

6. Hit PF12 to process.

7. Hit PF3 to get out of patch mode. You will get back to the Customize Control Diskette menu.

8. Hit PF12 to file away what you just did.

You can IML once the process is over.

F.3   Getting the Universal TRN Address of the 3174

After proper installation of the Token-Ring Adapter card, you may obtain the 'burned-in' or universal adapter address by following the steps presented here.

The alphabetic characters of the universal address appear as other symbols; for this reason, the following table is included to help the reader to correctly interpret them.

```
BITS 4-7    |   Character displayed
-----------+----------------------
    A       |         - (dash)
    B       |         E
    C       |         H
    D       |         L
    E       |         P
    F       |           (blank)
```

- Insert the utility diskette (level S1.0, A1.5 or later for the 3174 Gateway, level A2.0 or later for the 3174 DSPU) into diskette drive 1.

- At the operator panel, press and hold the ALT1-Key.

- Holding the ALT1-Key, press and release the IML-Key.

- When '40' is displayed, press the ENTER-Key.

- The display connected to port 0 will show the MASTER MENU.

- Enter a '4', the DIAGNOSTIC TEST MENU appears.

- Enter '3110'
    '31' is the hardware group (HG) of the adapter.
    '10' is the function code (FC): 'Display universal address'.

- 16 digits, (e.g. '4535 1000 5A06 00F2') will be displayed; in this example,
    '4535' is the status code
    '10005A' is IBM's manufacturer ID
        (the first two bits in byte 0 of a universally
        administered address are '00')
        (the first two bits in byte 0 of a locally
        administered address are '01')
    '0600F2' is the unique portion of this adapter address.

- To make another selection, press ENTER.

F.4   How to display the 3174 Event Logs

At a native attached CUT display:

* Holding down the Alt-Key, press the Test-Key.

* When 'TEST' appears in the OIA (Operator Information Area) press PF12.

* Select '1' from the 3174 Test Menu.

* Select '2' from the Logs Menu. (All Events Logged).

    Use the 3174 Maintenance Manual (SY27-2572) or the 3174 Help Desk Manual (GA23-0217) for interpretation of the event log entries.

* Use the Alt/Test-keys again to exit test mode.

F.5   Setting the Hardware Timer

For most of the cases during problem determination, the log entries of the 3174 controllers can be very helpful. To establish a correlation between those logs we recommend that you set date and time on all 3174s (please avoid power them off afterwards because the timer will have to be setup again)

The timer can be set with the following procedure:

- Insert the utility diskette into diskette drive 1.

- At the operator panel, press and hold the ALT1 key.

- While holding the ALT1 key, press and release the IML key.

- When '40' is displayed, press the ENTER key.

- The display connected to port 0 will show the MASTER MENU.

- Enter a '4'; the DIAGNOSTIC TEST MENU should appear.

- Enter '0802', where
    '08' is the hardware group (HG) of the timer
    '02' is the function code (FC): 'set day/time'

- At 4542, enter 'ddddhhmm' where
    'dddd'   is the work day (0000 through 0255)
    'hhmm'   is the time value (0000 through 2359)

- To make another selection, press ENTER.

F.6 IBM 3174 Large Control Unit Plug Chart

The following chart shows the card locations recommended for all 3174-0xx features depending on the model. The part numbers and the type numbers as shown in the online test 'Hardware Configuration' are shown too.

Card Loc.	Model	Function	P/N	Hardw.Type
11	1L	NLCA Adapter	66X2628	9210
	3R	T. R. Adapter	69X7832	9350
12	1L / #3025	T. R. Adapter	69X7832	9350
	1L 1R 2R 3R	ASCII Adpt. HG–23	4804463	9331
13	1L 1R 2R 3R	ASCII Adpt. HG–22	4804463	9331
14	1L 1R 2R 3R	ASCII Adpt. HG–21	4804463	9331
15	1L 1R 2R 3R	TMA Adpt.–Port 0	61X4649	9172
16	1L 1R 2R 3R	TMA Adpt.–Port 8	61X4649	9172
TMA Ports 16 & 24 All Models & Features		Install remaining TMA's after all other cards are installed in the next open card location using the following TMA priority sequence 11,23,12,17,24,13		
17	1L 1R 2R 3R Memory Feature	512K Memory	61X4650	9051
		1 MEG Memory	61X4651	9052
18	1L 1R 2R 3R	Engine	56X4804	9500
19	1L 1R 2R 3R	1 MEG Memory	61X4651	9052
20	1L 1R 2R 3R Memory Feature	512K Memory	61X4650	9051
		1 MEG Memory	61X4651	9052
21	1L 1R 2R 3R	File Adapter	73X3906	9120
22	1L 3R	Terminal Adapt.	73X3909	9150
	1R	PCA–1 EIA/V.35	66X2588	9253
	2R	PCA–2 X.21	66X2590	9273
23	1R 2R	Terminal Adapt.	73X3909	9150
24	1R 2R 3R	Encrypt/Decrypt	61X4516	9030

READER'S COMMENTS

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Document Number GG24-3061-01

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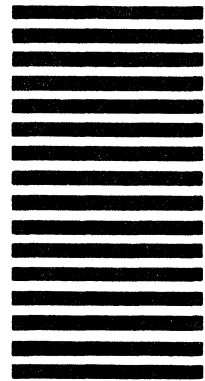
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