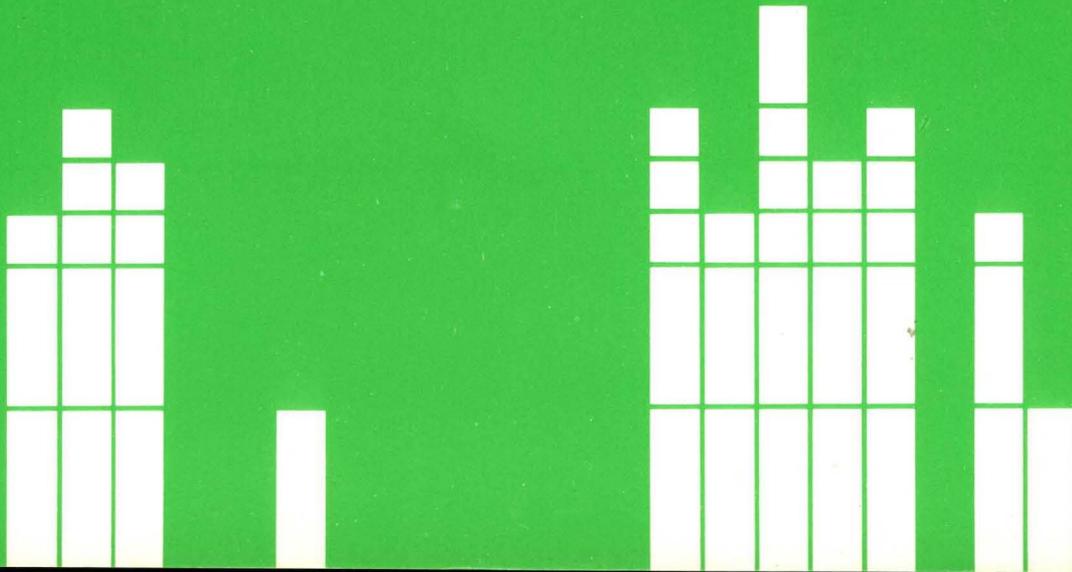


# 4700 Finance Communication System

## Installation Planning

**IBM**



---

**4700 Finance  
Communication System**

---

**Installation Planning**

---

---

**File Number  
S370/4300/8100/S34-15**

---

---

**Publication Number  
GC31-2018-3**

---

## Federal Communications Commission (FCC) Statement

**Warning: This equipment generates, uses and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.**

This FCC statement applies to all of the devices in the 4700 system that are used in the United States.

### Third Edition (July 1983)

This edition, GC31-2018-3, is a major revision of GC31-2018-2 which is obsolete. This edition also obsoletes *IBM 4704 Display Station Model 2 and 3 Introduction and Installation Planning*, GC31-2049-1, *IBM 4720 Forms/Passbook Printer Introduction and Installation Planning*, GC31-2050-0, and *IBM 4701 Controller Model 2 Disk-Storage Feature Introduction and Installation Planning*, GC31-2052-0.

This edition is for planning purposes only.

Technical changes are indicated by a vertical line to the left of each change.

Specifications contained in this publication are subject to changes, which will be reported in subsequent revisions or Technical Newsletters. Before using this publication in connection with the operation of IBM systems, consult *IBM System/370 Bibliography of Industry Systems and Application Programs*, GC20-0370, for the editions that are applicable and current.

References in this publication to IBM products, programs, or services do not imply that IBM intends to make them available in all countries in which IBM operates. Any references to IBM program products is not intended to state or imply that only IBM program products may be used. Any functionally equivalent program may be used instead.

Publications are not stocked at the address given below; requests for IBM publications should be made to your IBM marketing representative or to the IBM branch office serving your locality.

A form for reader's comments is at the back of this publication. If the form has been removed, comments may be addressed to IBM Corporation, Information Development, Department 78C, 1001 WT Harris Blvd., Charlotte, NC 28257 USA. IBM may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

## Preface

This manual guides your institution in planning the installation of the IBM 4700 Finance Communication System. It is intended primarily for persons who are responsible for installation planning and for those who are responsible for site preparations.

The manual addresses these topics:

- Installation planning tasks
- Site preparation
- Remote communication facilities
- Branch office cabling

The devices and programs described herein will not necessarily be made available in all countries. Consult your IBM marketing representative regarding the availability of 4700 system components in your location.

All references to IBM part numbers throughout this manual signify either that particular part number or its equivalent.

Commercial part numbers listed in this manual are those that meet IBM specifications at the time of publication. Only a few vendors are listed; this does not imply that only these vendors meet the IBM specifications; other vendors might have equal or superior products.

While IBM makes many basic functions available, the user chooses the functions to be used, and determines in what manner they will be used. It is the user's responsibility to establish and maintain appropriate operating procedures for the equipment. This, of course, includes those related to the integrity and security of the system, together with audit and control measures.

## Related Publications

- *IBM 4700 Finance Communication System: System Summary*, GC31-2016
- *IBM 4700 Finance Communication System: Physical Planning Template*, GC31-2019
- *IBM 4704 Display Station Operating Instructions*, GC31-2025
- *IBM 3270 Information Display System: Installation Manual - Physical Planning*, GA27-2787
- *IBM 3600 Finance Communication System: Installation Manual - Physical Planning*, GA27-2766
- *IBM 3624 Consumer Transaction Installation Manual - Physical Planning*, GA26-1658
- *IBM 3694 Document Processor: Installation Manual - Physical Planning*, GC31-2010
- *IBM Multiuse Communication Loop Planning Guide*, GA23-0038

- *Installation and Assembly of Coaxial Cable and Accessories*, GA27-2805
- *Form Design Reference Guide For Printers*, GA24-3488.

For information in planning physical installations at the central processing sites, see:

- *IBM System/370 Installation Manual - Physical Planning*, GC22-7004
- *IBM System/370 World Trade Installation Manual - Physical Planning*, GC19-0004
- *IBM Input/Output Equipment Installation Manual - Physical Planning for System/360, System/370, and 4300 Processors*, GC22-7064
- *IBM 8100 Information System: Site Planning and Preparation Guide*, GA27-2884
- *IBM 4300 Processors Installation Manual - Physical Planning*, GA24-3667

# Contents

## **Chapter 1. Introduction 1-1**

- Customer Setup 1-1
- Compatibility with 3600 System 1-1

## **Chapter 2. 4700 System Installation Planning 2-1**

- Organizing Your Installation Plan 2-2
- Describing the Major Installation Planning Tasks 2-3
  - Design the System 2-4
  - Establish Education Requirements 2-4
  - Design the Communication Network 2-4
  - Application Program Development 2-4
  - Schedule Site Preparations 2-4
  - Establish Network Control Responsibility 2-5
  - Establish an Equipment Inventory Control Procedure 2-5
  - Order Supplies and Accessories 2-5
  - Select Training Instructors 2-5
  - Train Setup Team 2-6
  - Prepare Controller Diskettes 2-6
  - Select Branch Relief Team 2-6
  - Train Personnel 2-6
  - Install First Branches 2-6
  - Install Other Branches 2-7

## **Chapter 3. Physical Site Preparations 3-1**

- Site Preparation Tasks 3-3
  - Preliminary Tasks 3-3
    1. Prepare an Equipment Inventory Work Sheet for Each Site 3-3
    2. Prepare a Work-Station Configuration Sheet 3-4
    3. Design a Site Floor Plan 3-13
  - Tasks that Begin Six Months Before Setup 3-14
  - Tasks that Begin Three Months Before Setup 3-15
  - Tasks to Begin Two Weeks Before Setup 3-15
- Site Preparation Recommendations 3-16
  - Product and Environment Safety 3-16
  - Product Environment 3-16
  - Electrostatic Discharge 3-17
  - Electromagnetic Compatibility 3-17
  - Electrical Requirements 3-17
    - Voltage and Frequency 3-17
    - Power Cords and Outlets 3-17
    - Branch Circuits and Grounding 3-18
  - Lightning Protection 3-18
    - Power Lines 3-18
    - Communication Lines 3-18
    - Signal Lines 3-18

## **Chapter 4. Communication Facilities 4-1**

- Modem Definitions 4-1
  - IBM Modems Applicable to the 4700 System 4-1
  - PTT Modems 4-2
- Termination Requirements 4-2
  - Host (Figures 4-2 and 4-3) 4-2
  - Modem Options 4-2
    - Clear-to-Send Delay and Echo-Clamp (Receiver Unclamp) Delays 4-3
    - New Synch 4-3
    - Secondary Facility Capability 4-3
  - NRZ/NRZI 4-3
- Communication Channel Specifications 4-3
  - Host Link 4-3
  - Remote Loops 4-3
- Common Carrier Facility Specifications 4-4
  - Point-to-Point Facilities (Figure 4-2) 4-4
  - Multipoint Facilities (Figure 4-3) 4-4

## **Chapter 5. Cabling Information 5-1**

- Getting Started 5-1
- Host-Link Cables 5-1
  - Host-Link Cabling Information 5-2
- Loop Cables and Accessories 5-5
  - Brief Introduction of Loops 5-5
  - Loop Components 5-8
    - Describing Loop Cables 5-8
    - Describing Loop Terminal Ports 5-11
    - Describing the Loop Repeater 5-14
  - Determining Your Loop Cable and Connector Needs 5-15
    - Local Loop Cable and Connector Needs 5-16
    - Remote Loop Cable and Connector Needs 5-18
  - Purchasing Loop Cables and Connectors 5-21
    - The Cable Chart 5-22
    - Purchasing Loop Terminal Port Connectors 5-24
    - Specifications for Bulk Cable 5-25
    - Specifications for Right-Angle Connectors 5-28
    - Specifications for Wall-Plate Assemblies 5-30
  - Installing and Checking the Loop 5-32
    - Special Considerations and Information 5-32
    - Things to Do Before Installing the Loops 5-34
    - Installing the Loops 5-36
    - Checking the Loops 5-42
    - Loop Lightning Protection 5-42
- Device Communications Adapter (DCA) Cables 5-45
  - Ordering Coaxial Cable 5-46
  - Coaxial Cable Types 5-46
  - Preassembled Cable IBM Part Numbers 5-46
  - Nonassembled Cable Specifications 5-46

## **Chapter 6. Machine Specifications 6-1**

- 4701 Controller 6-2
- Diskette Expansion Unit (Feature) 6-4
- Disk Expansion Unit (Feature) 6-6
- 4704 Display Stations and Devices 6-8
  - 4704-1 Display Station Control Module 6-8
  - 4704-1 Display Station Display Monitor (Large Screen) 6-10
  - 4704-1 Display Station Display Monitor (Small Screen) 6-12
  - 4704-2 Display Module 6-14
  - 4704-3 Display Module 6-16
  - Cradle For 4704 Displays 6-18
  - Cradle Mounting Bracket 6-19
  - Function Keyboard 6-20
  - Alphameric Keyboard 6-21
  - Expanded Alphameric Keyboard 6-22
  - Administrative Keyboard 6-23
- Magnetic Stripe Unit 6-24
- PIN Keypad 6-25
- Encrypting PIN Keypad 6-27
- 4710 Printer 6-29
- 4720 Printer (Models 1 and 3) 6-31
- 4720 Printer (Models 2 and 4) 6-33
- 3603 Terminal Attachment Unit (Models 1, 2, and 3) 6-35
- Loop Repeater (part number 4400002) 6-37

## **Appendix A. Forms A-1**

## **Appendix B. Remote Loop Diagrams B-1**

## **Appendix C. Power Cords, Plugs, and Receptacles C-1**

- Power Cords C-1
- Plugs and Receptacles C-1

## **Appendix D. Power Cords and Plugs (World Trade) D-1**

- WT Power Plug Requirements for 4700 D-1
- Installation of a Power Plug D-1

**Appendix E. Voltage Limitations E-1**

**Appendix F. Supplies and Specifications F-1**

Form Specification Highlights for 4700 Printers F-1

4710 Printer Forms F-1

4720 Printer Forms F-3

Cut Form F-3

Passbooks F-5

Journal F-8

Ordering Supplies and Accessories F-10

For 4710 Receipt/Validation Printer F-10

For 4720 Printers F-10

For 4701 Controller F-11

Magnetic Stripe Specifications for Passbooks F-11

**Appendix G. Loop Installation Checks G-1**

Tools and Parts Needed to Check Your Loop G-1

Loop Checks (Before Installation) G-2

Prerequisite for Persons Performing These Procedures G-2

Checking Preassembled Cables "a" or "g" G-3

Checking Preassembled Cable "f" G-4

Checking for Shorted Wires or Connections G-4

Checking for Continuity G-5

Checking Bulk Cable "a", "g", or "i" G-6

Checking Bulk Cable "f" G-7

Checking Wall-Plate Assemblies G-8

Loop Checks (After Installation) G-9

Loop Checkout Procedures 1 G-10

Loop Checkout Procedures 2 G-14

Checking the Cable Segments and Wall-Plates G-15

Remote Loop Checkout Procedure G-23

**Index X-1**



# Figures

- 0-1. 4700 Finance Communication System Network 2
- 2-1. Organizing the Installation Planning Tasks 2-2
- 2-2. Major Installation Planning Tasks 2-3
- 3-1. Site Preparation Tasks 3-2
- 3-2. Sample Work-Station Layout Diagram 3-4
- 3-3. Basic Teller Work Station 3-5
- 3-4. Basic Teller Work Station with the Control Module 3-6
- 3-5. Display-Station Cabled to a Control Module 3-9
- 3-6. Basic Administrative Work Station with Printer 3-11
- 3-7. Basic Administrative Work Station with Control Module 3-12
- 3-8. An Example of a Site Floor Plan 3-13
- 3-9. Temperature and Humidity Requirements 3-16
- 4-1. Modems 4-2
- 4-2. Point-to-Point Facilities 4-5
- 4-3. Multipoint Facilities 4-6
- 5-1. Host Connections Using a Standard EIA/CCITT Connector 5-3
- 5-2. Host Connections Using an X.21 Connector (World Trade) 5-4
- 5-3. Example of Local Loops 5-6
- 5-4. Example of Remote Loops 5-7
- 5-5. Right-Angle Loop Cable Connectors 5-12
- 5-6. Loop Cable Wall-Plate Connector Assembly 5-12
- 5-7. Right-Angle Loop Connectors Attached to a Terminal Device Connector 5-13
- 5-8. Example of a Loop Requiring a Loop Repeater 5-14
- 5-9. Examples of Local Loops and Their Cables 5-16
- 5-10. Example of a Remote Loop and the Cables Required 5-19
- 5-11. Cable Chart 5-22
- 5-12. Bulk Cable Specification Chart 5-26
- 5-13. Right-Angle Terminal Port Specifications 5-28
- 5-14. Wall-Plate Terminal Port Specifications 5-30
- 5-15. Pre-Installation Checks Diagram 5-35
- 5-16. Assembling Right-Angle Connectors on Loop Cable 5-37
- 5-17. Wall-Plate Assembly (part number 5929886) Wiring 5-39
- 5-18. Typical Electrical Terminal Box for a Wall-Plate Assembly 5-40
- 5-19. Wall-Plate Assembly Using Single and Double Twin-Pair Cable 5-41
- 5-20. Detailed View of Loop Lightning Protection RPQ 5-44
- 5-21. DCA Coaxial Cable 5-45
- 5-22. IBM Part Numbers of Connectors and Connector Kits 5-47
- 5-23. Bulk Coaxial Cable Specifications 5-48
- A-1. Branch Equipment Inventory Work Sheet A-1
- A-2. Branch Equipment Inventory Work Sheet Partially Filled In A-2
- A-3. Example of a Cable Inventory Sheet A-3
- A-4. Example of a Cable Inventory Sheet Filled In A-4
- A-5. Loop Layout Form A-5
- A-6. Example of a Loop Layout A-6
- B-1. 3603/Remote Subloop Cable (IBM part number 1745348) and Loop Repeater/Loop Port Cable (IBM part number 1745372) B-1
- B-2. 3603 (all models) to Common Carrier Line Cable B-2
- B-3. Common Carrier Adapter (IBM Part Number 1741656) B-3
- B-4. UK Modem Adapter Cable B-4
- B-5. 3603/DAA Cable (IBM part number 1745349) B-5
- B-6. 3603 Jumper (IBM part number 1745353) B-5
- B-7. Line Termination Jacks B-6
- B-8. 25-Pin EIA/CCITT Female Connector (IBM part number 765294) B-6
- B-9. Connection of Full-Duplex Communication Facilities to Remote 3603-1 B-7
- B-10. Type WE283B Plug B-8
- C-1. Power Cord Specifications C-1
- C-2. Plug Types C-2
- C-3. Plugs and Receptacles C-2
- D-1. Plug with Side Earthing (Ground) Pin — 16A Max, 250V D-3
- D-2. Plug with Earthing (Ground) Pin — 10A Max, 250V D-3
- D-3. Plug with Earthing (Ground) Pin — Same plug as required for U.S.A. — 15A Max, 125V D-3
- D-4. Plug with Contact Tube and Side Earthing (Ground) — 16A Max, 250V D-3
- D-5. Plug with Earthing (Ground) Pin — 13A Max, 250V D-3
- D-6. Plug with Earthing (Ground) Pin — 10A Max, 250V D-4
- D-7. Plug with Earthing (Ground) Pin — 16A Max, 250V D-4

- D-8. Plug with Earthing (Ground) Pin — 10A Max, 250V D-4
- D-9. Locking Plug with Earthing (Ground) Pin — 15A Max, 125V D-4
- D-10. Plug with Earthing (Ground) Pin — 16A Max, 250V D-4
- D-11. Plug with Earthing (Ground) Pin — 16A Max, 250V D-5
- D-12. Plug with Earthing (Ground) Pin — 15A Max, 250V D-5
- D-13. Plug with Earthing (Ground) Pin — 15A Max D-5
- E-1. Voltage Limitations E-1
- F-1. 4710 Cut Forms (Receipt) Specifications F-1
- F-2. 4710 Journal Specifications F-2
- F-3. 4720 Cut Form Dimensions and Parameters F-4
- F-4. 4720 Vertical-Fold-Passbook Dimensions and Parameters F-6
- F-5. 4720 Horizontal-Fold-Passbook Dimensions and Parameters F-7
- F-6. 4720 Journal Dimensions and Parameters F-9
- F-7. Passbook Specifications F-12
- G-1. Test Jack and Plug Used When Checking Loops G-1
- G-2. Loop Checks Diagram (After Installation) G-9



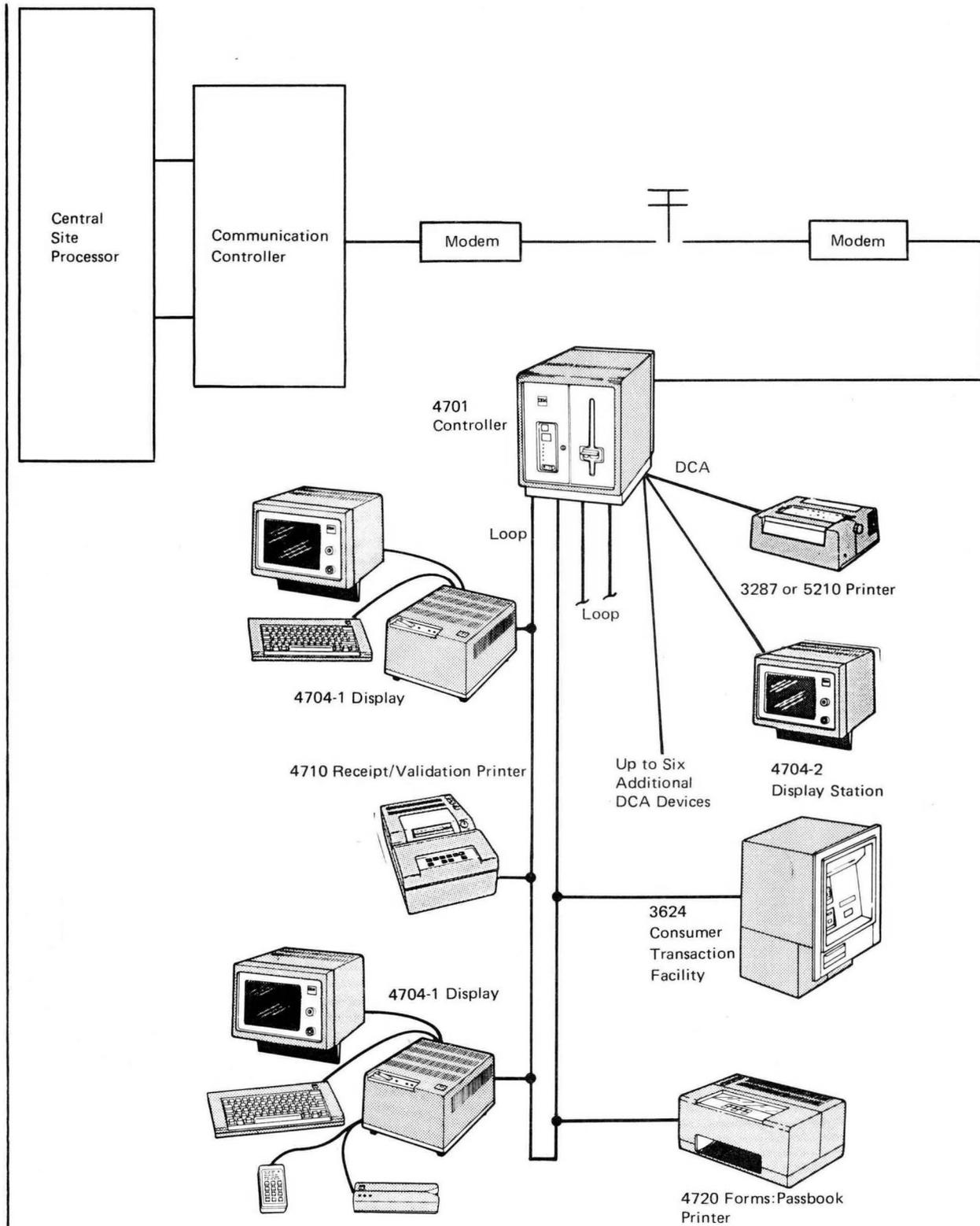


Figure 0-1. 4700 Finance Communication System Network

## Chapter 1. Introduction

The IBM 4700 Finance Communication System enables its users to communicate with a central site processor (host system). The 4700 system (consisting of a controller and the attached devices and components) is usually installed at the branch location. The controllers are programmed to communicate with the host system and individual work stations located throughout the branch office (see the figure on the facing page). Most work stations are equipped with devices that give you the capability of two-way communications with the controller and central processor.

Before you can install the 4700 system in a financial or other organization, a series of tasks must be accomplished at the central site and at each branch location. These tasks are your responsibility and should be performed for an efficient and effective installation. These tasks consist of planning the system design, preparing each site for installation of the new equipment, and training of employees to set up, operate, and maintain the new equipment. This manual provides information needed to understand and carry out the tasks associated with site preparation. Tasks associated with system design, application programming, and employee training are not covered in depth in this manual, but are identified as major tasks of an installation plan to remind you that these tasks must be addressed.

### | Customer Setup

All 4700 devices are designed so the customer can set them up. This means that the customer is responsible for unpacking the devices from the shipping container, for physically setting up the devices (which involves connecting power cords, signal cables, and attaching accessories) and for testing the devices.

### Compatibility with 3600 System

The IBM 4700 Finance Communication System is compatible with IBM 3600 Finance Communication System devices. Loop and Device Cluster Adapter (DCA) cabling has not changed. The 4700 devices can be attached to a 3600 system controller through the existing loops and 3600 devices can be attached to a 4700 controller through its loop cabling. The 3270 printers and displays can be attached to the controller DCA adapters in either system.

Most 3600 system devices are not CSU devices; because of this, disconnecting and moving of some 3600 devices may require the assistance of IBM Field Engineering service personnel.



## | Chapter 2. 4700 System Installation Planning

Immediately after you make a commitment to install a 4700 system, you should develop a plan to prepare and guide your organization through the installation. The installation plan should contain a series of preparatory tasks that must be completed before installing your new system. This chapter:

- Suggests an organization for your installation plan.
- Gives an outline and general description of each major task.
- Recommends the time that each task should be completed.

If you need more detailed information about the task, see your IBM marketing representative.

Each installation has different requirements; so, the tasks that we provide may not completely fill the needs of every installation plan. However, the task we provide is a guide to help you establish an installation plan that will best fit the needs of your organization.

## Organizing Your Installation Plan

An efficient installation requires good planning. Because it is difficult to find one person with broad experience in all categories, many institutions separate the installation planning responsibilities and tasks into three major areas:

- System Design and Application Program Development
- Physical Site Planning and Preparations
- Organizing Training Requirements.

Under each major area is a set of major tasks. Figure 2-1 shows the example of organization and separation of installation planning tasks cited here.

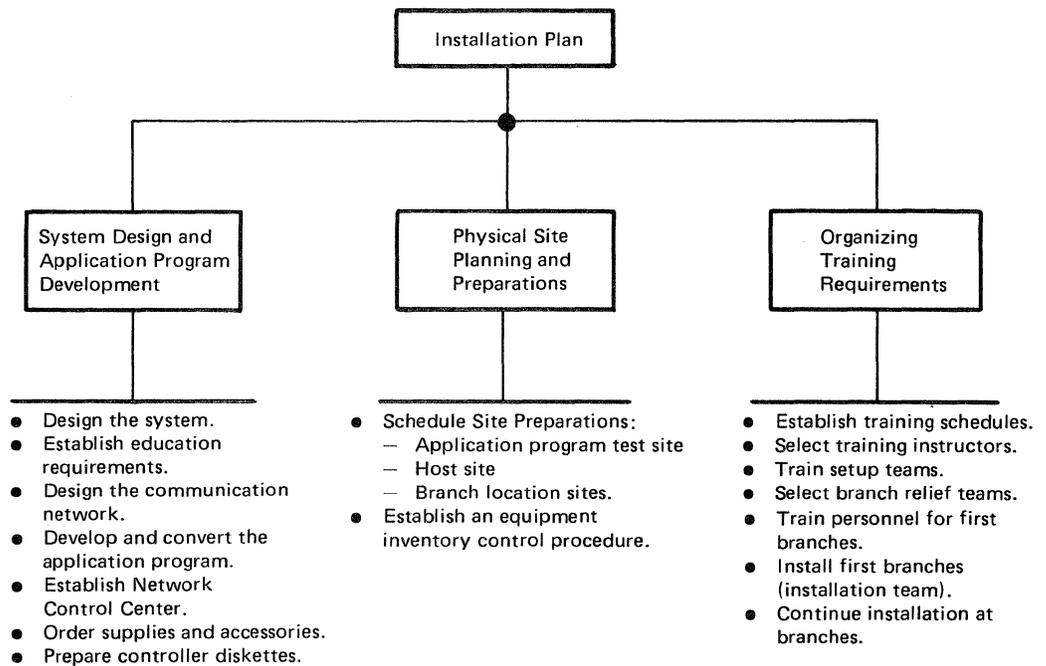


Figure 2-1. Organizing the Installation Planning Tasks

## Describing the Major Installation Planning Tasks

This section contains a high-level description of each installation planning task outlined in Figure 2-2.

MAJOR TASKS OF INSTALLATION PLANNING	Not Required	Date	
		Start	Finish
<ul style="list-style-type: none"> <li>● Design the system.</li> <li>● Establish Education Requirements:               <ul style="list-style-type: none"> <li>– Management</li> <li>– Programmers</li> <li>– Users.</li> </ul> </li> <li>● Design the communication network.</li> <li>● Develop and convert application programs for host and branch sites.</li> <li>● Schedule Site Preparations at:               <ul style="list-style-type: none"> <li>– Application program test site</li> <li>– Host site</li> <li>– Branch sites.</li> </ul> </li> <li>● Establish Network Control Center.</li> <li>● Establish an equipment inventory control procedure.</li> <li>● Order supplies and accessories for new equipment.</li> <li>● Select training instructors.</li> <li>● Train setup teams.</li> <li>● Prepare controller diskettes.</li> <li>● Select branch relief teams.</li> <li>● Train personnel for first branches:               <ul style="list-style-type: none"> <li>– Teller</li> <li>– Administrative.</li> </ul> </li> <li>● Install first branches (see setup instructions).</li> <li>● Install other branches.</li> <li>●</li> <li>●</li> </ul>			

Use blanks to add tasks according to local requirements.

Figure 2-2. Major Installation Planning Tasks

## | *Design the System*

The first task on your installation plan should be designing the system. To ensure that the 4700 system meets the needs of your institution, people with a good understanding of your operations should design the system. For instance, during the system design period, have someone with branch experience work closely with the system analysts and/or programmers. This person can provide much needed knowledge of branch operations and ensure that your application programs meet the needs of teller and administration operations at the branch locations, as well as the central site.

## | *Establish Education Requirements*

The installation and operation of a 4700 Finance Communication System will affect a number of people in your organization. To prepare these people for responsibilities concerning the installation and operation of the new system, you should establish education requirements early in the planning cycle. People in management positions, analysts, system programmers, and users of the new equipment might require some level of education before they can carry out any assignments concerning the new system. The timing and level of that education should be established early in the planning cycle.

## | *Design the Communication Network*

Communication facilities, which include such things as controllers, common carrier lines, and modems, physically tie a communication network together. You are also required to develop or select programs to control the data that flows across the network. Many variations in both hardware and programming facilities can be selected when establishing a communication network. The selection of these facilities can affect both the cost and efficiency of your network. Because of this, it is important that you design your communication network early in the planning cycle.

## | *Application Program Development*

Application program development logically follows the System Design phase. Schedule your application program development so that it is completed on time and will not delay your schedule for installing 4700 systems at branches. You can develop application programs on your host system. Test and debug your programs prior to setting up new equipment at its permanent location. To test and debug your application programs, you should set up a test site.

## | *Schedule Site Preparations*

The person responsible for site preparation planning and implementation will arrange for such things as physical alterations (that might be necessary at any of the sites), estimating, ordering, installing loop cables, and installing a common carrier communication link between the branches and host system.

***Application Program Test Site:*** If new application programs are developed you should consider setting up a test area for testing and debugging programs on the new 4700 devices. This test area will require such things as tables to hold the work-station devices and loop and power wiring. If your application program test site is a remote location, a communication link to the host system is necessary.

You can set up teller and administration work-station devices in the test area for program checkout. If necessary, you can use these same work stations later for teller training on the new equipment.

Be sure to order enough ribbons, paper, and other supplies for the work-station devices that will be used for testing the new programs. See your IBM marketing representative for information on ordering supplies.

**Site Preparations at Branches and Central Site:** Site preparations are generally needed at both the branch and host system areas. The central site generally requires that arrangements be made to install modems and communication lines to link the host system with the branches. The major portion of this manual is devoted to site preparations at the branch sites; refer to Chapter 3 for more detail on these requirements.

### ***Establish Network Control Responsibility***

The people responsible for network control will analyze problems that arise throughout the data communication network. This would include analyzing problems that occur on the network between the host and branches and problems that occur in the individual branches. The center for handling this responsibility should be near the host system to give these people access to the host system error logs and diagnostic printouts.

People who have this responsibility should have a good knowledge of branch operations, as well as having system and network knowledge, because they will be in communication with people in the branches whenever a problem occurs. This knowledge will enable them to help the branch employee correct any problem that occurs during a transaction.

### ***Establish an Equipment Inventory Control Procedure***

Before the new 4700 devices start arriving, you will have to develop an inventory list to check in all the new devices. You can use this list to ensure that all devices have arrived before you begin setup and installation.

It would be to your advantage to prepare an equipment inventory work sheet for each branch site. Chapter 3, "Physical Site Preparations" provides information about preparing and using an equipment inventory work sheet.

### ***Order Supplies and Accessories***

Order supplies and accessories (see Appendix F) for the incoming new equipment well in advance of installing that equipment in any branch. Your IBM marketing representative can help you determine the supplies you will need.

### ***Select Training Instructors***

Before you can install equipment or make a branch operational, your employees must receive training on the new equipment. The instructors you select to train your employees must be very familiar with the teller and administrative tasks in the branch (possibly your current teller training instructors).

You should select the instructors early in your planning cycle to allow them time to prepare. They must become familiar with the new equipment, then prepare a training program for teaching other employees at the various branches. The training schedule should correspond with the installation schedule.

## ***Train Setup Team***

We recommend that you select people to act as a setup team for installing the new equipment at the branches. These employees should first become familiar with unpacking, setting up, and testing the new equipment. Using the same people to set up the equipment provides experience and they become more efficient at performing these tasks. Initial testing of devices can be done during off hours, when the branch is closed, to avoid interrupting the normal operations in the branch office.

The setup team(s) can begin unpacking and testing the new equipment bringing that branch online with your host system. By testing the individual devices before coming online, you ensure that the individual devices are operating correctly. After the branch is closed, you can set up the individual teller and administrative work stations, attach them to the controllers, and test them from both the controller and host system.

## ***Prepare Controller Diskettes***

After your controller application programs have been tested, ensure that you prepare enough operating diskettes for all controllers. It would also be wise to produce enough backup diskettes to meet local needs.

## ***Select Branch Relief Team***

The branch relief team members are generally experienced tellers and administrative people who can fill in at branches while the people from the branch are being trained to operate the new 4700 devices.

## ***Train Personnel***

Training of personnel should take place as close as possible to the *day* you install 4700 devices in that branch. As the time between training and actual use of the devices increases, so does the difficulty in becoming immediately proficient with the devices. If possible, train them about one week before they actually begin using the equipment at the branch.

It takes only two to three days to train an experienced teller or administrative person how to operate the 4700 devices. If circumstances allow, it would be to your advantage to begin training your employees from each branch in the latter part of the week, just before that branch comes online with the host. This enables the instructors to assist the branch people in the early part of the next week as they begin operations with the new devices.

## ***Install First Branches***

Begin setup and checkout of your new 4700 devices in the branch at least a week before that branch is scheduled to open with the new system installed. At this point in your plan, all site preparations including installation of your communication lines should be completed and checked out.

Use the setup instructions that accompany each device (in the shipping carton that is marked as containing the instructions). After setup is completed, you should retain at least one copy of the setup instructions for each device type. These instructions can be used in the future when devices have to be disconnected for maintenance or relocation.

### ***Install Other Branches***

After the initial branch(es) has been installed, make any adjustments in your procedures that may be necessary and continue with your next branch to be installed.



## Chapter 3. Physical Site Preparations

Physical site preparations are the tasks that you must accomplish at all branches before installing a 4700 system. These tasks are of:

- Preparing or altering the teller and/or administrative work stations.
- Ordering and installing cables.
- Installing a common carrier data line.
- Altering the host site to accommodate your 4700 system.
- Making any other changes required at the branch locations.

You should prepare a site preparation schedule before preparing the site for 4700 equipment installation. The schedule should identify when site preparations start and are completed for each branch location and the central site. You should review this schedule with your IBM marketing representative.

You must complete a series of site preparation tasks before setting up devices at any of your branch locations. The chart (Figure 3-1) on the next page separates these tasks into groups based on when they should be performed, such as:

- *Preliminary Tasks*

You should perform these tasks as soon as you decide to install 4700 equipment. The chart (Figure 3-1) also contains blanks for your local requirements.

The remaining tasks are grouped according to when they should be accomplished.

- *Tasks To Begin Six Months Before Setup*
- *Tasks To Begin Three Months Before Setup*
- *Tasks To Begin Two Weeks Before Setup*
- *Setup Date*

These time estimates may not meet the requirements of all situations. Timing depends on things like (1)the amount of preparations or alterations required and (2)where you intend to purchase cables and other supplies.

SITE PREPARATION TASK CHECKLIST	Date		Not Required
	Start	Finish	
PRELIMINARY TASKS (begin as soon as possible)			
<ol style="list-style-type: none"> <li>1. Prepare an Equipment Inventory Work Sheet for each site.</li> <li>2. Prepare a Work Station Configuration Sheet (Identifying the devices at each work station).</li> <li>3. Design a Floor Plan for each site.</li> <li>4.</li> <li>5.</li> </ol>			
<b>TASKS TO BEGIN SIX MONTHS BEFORE SETUP</b> <ol style="list-style-type: none"> <li>1. Complete design of all structural changes.</li> <li>2. Determine cabling needs and source of purchase.</li> <li>3. Schedule installation of communication lines.</li> <li>4. Begin to assemble a setup team.</li> <li>5.</li> </ol>			
<b>TASKS TO BEGIN THREE MONTHS BEFORE SETUP</b> <ol style="list-style-type: none"> <li>1. Begin site alterations and cable installation.</li> <li>2. Verify communication line installation schedule.</li> <li>3. Check out the loop wiring (see "Loop Checkout").</li> <li>4. Order supplies and accessories.</li> </ol>			
<b>TASKS TO BEGIN TWO WEEKS BEFORE SETUP</b> <ol style="list-style-type: none"> <li>1. Test the communication link to host system.</li> <li>2. Train your setup team.</li> </ol>			
BEGIN SETUP AT SITE (see device setup instructions).			

Use blank lines to add tasks according to local requirements.

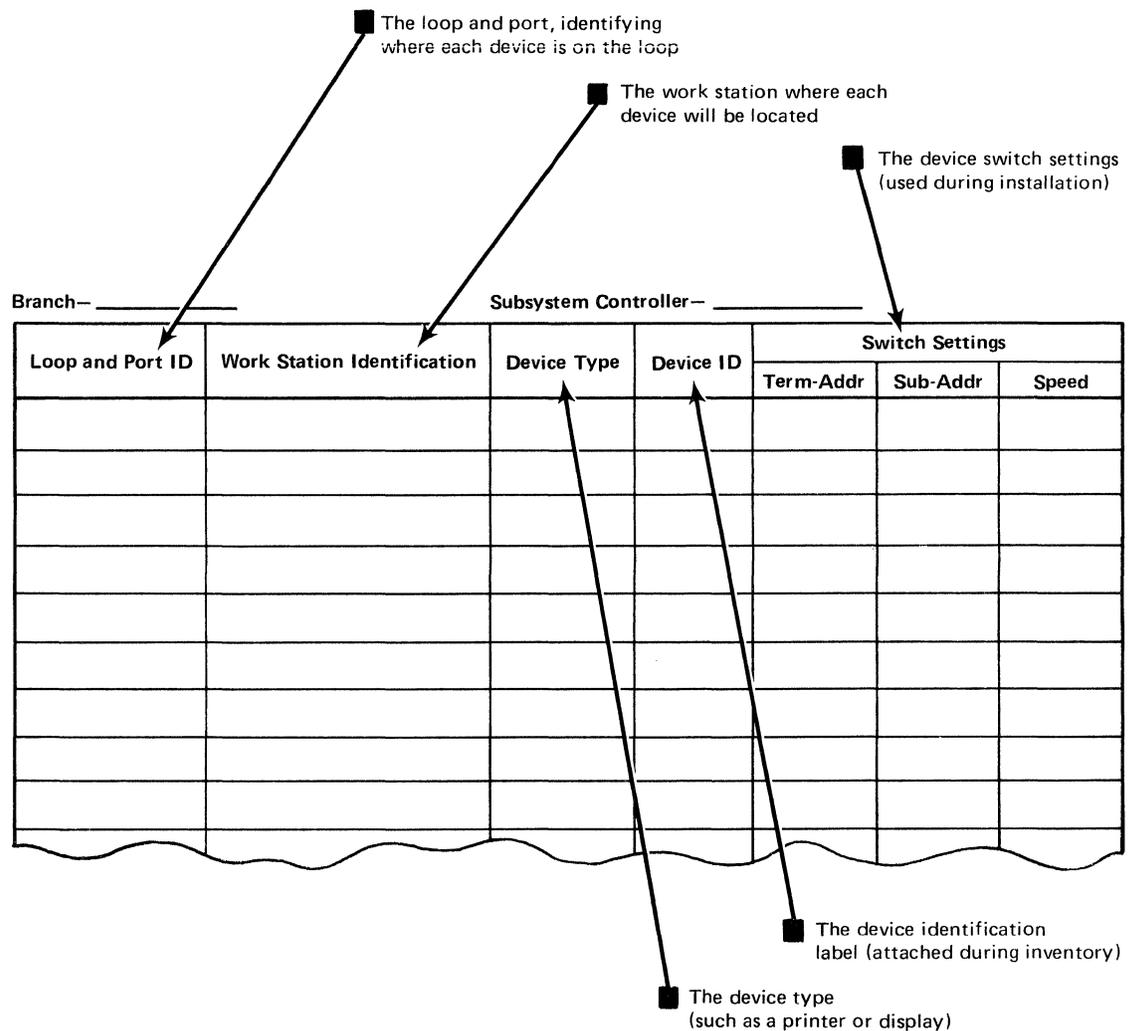
**Figure 3-1. Site Preparation Tasks**

## Site Preparation Tasks

### Preliminary Tasks

#### 1. Prepare an Equipment Inventory Work Sheet for Each Site

An inventory work sheet (shown below and also in Appendix A) helps you keep account of all devices to install at a site (branch location). The following diagram illustrates the Equipment Inventory Work Sheet and identifies some of the information it should contain:



## 2. Prepare a Work-Station Configuration Sheet

To determine the alterations required at a teller or administrative work station, you must know the devices that make up the work station (its configuration). A Work-Station Configuration Sheet should identify:

- The type of work station (teller or administrative)
- The devices at each work station
- The relative placement of each device at the work station (including the control module, if it applies).

Organizations using a basic configuration can use a simple work-station configuration sheet that identifies the device types located at the work station. Complex work-station types may require a layout diagram showing the placement of each device type. Work-station layout diagrams (see Figure 3-2) can be made to scale by using the 4700 Physical Planning Template. You should determine the devices for each work station when you purchase your 4700 equipment.

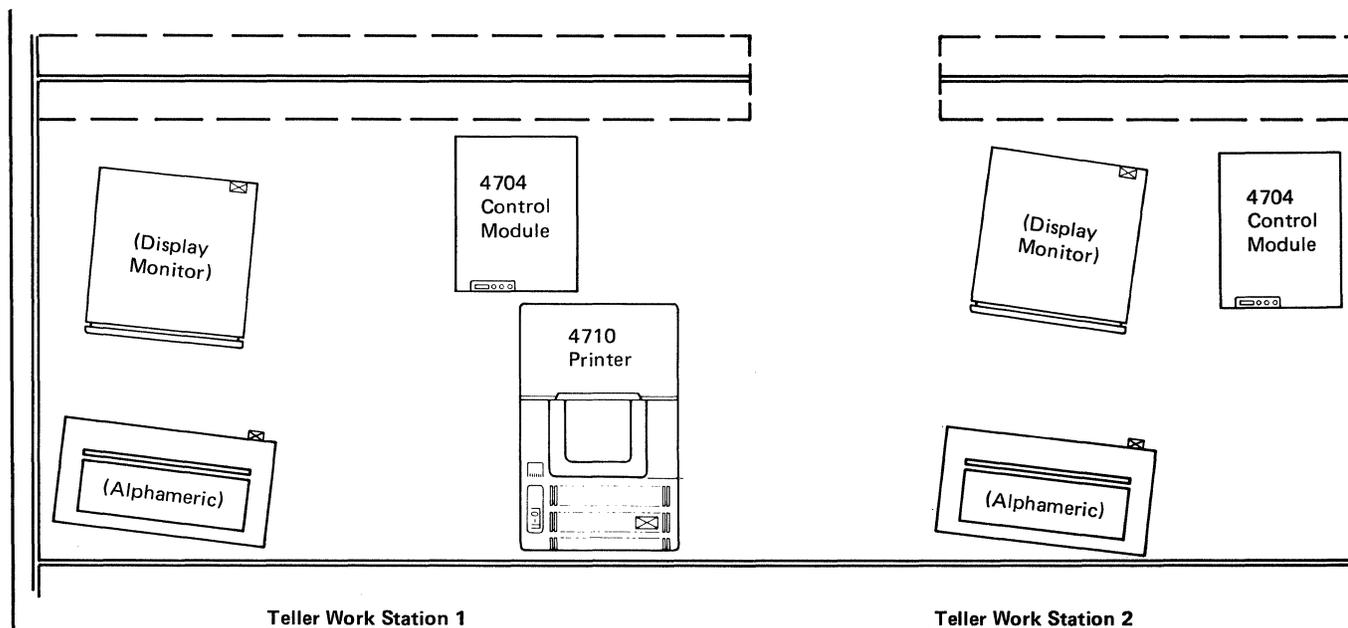


Figure 3-2. Sample Work-Station Layout Diagram

***Teller Work Station:***

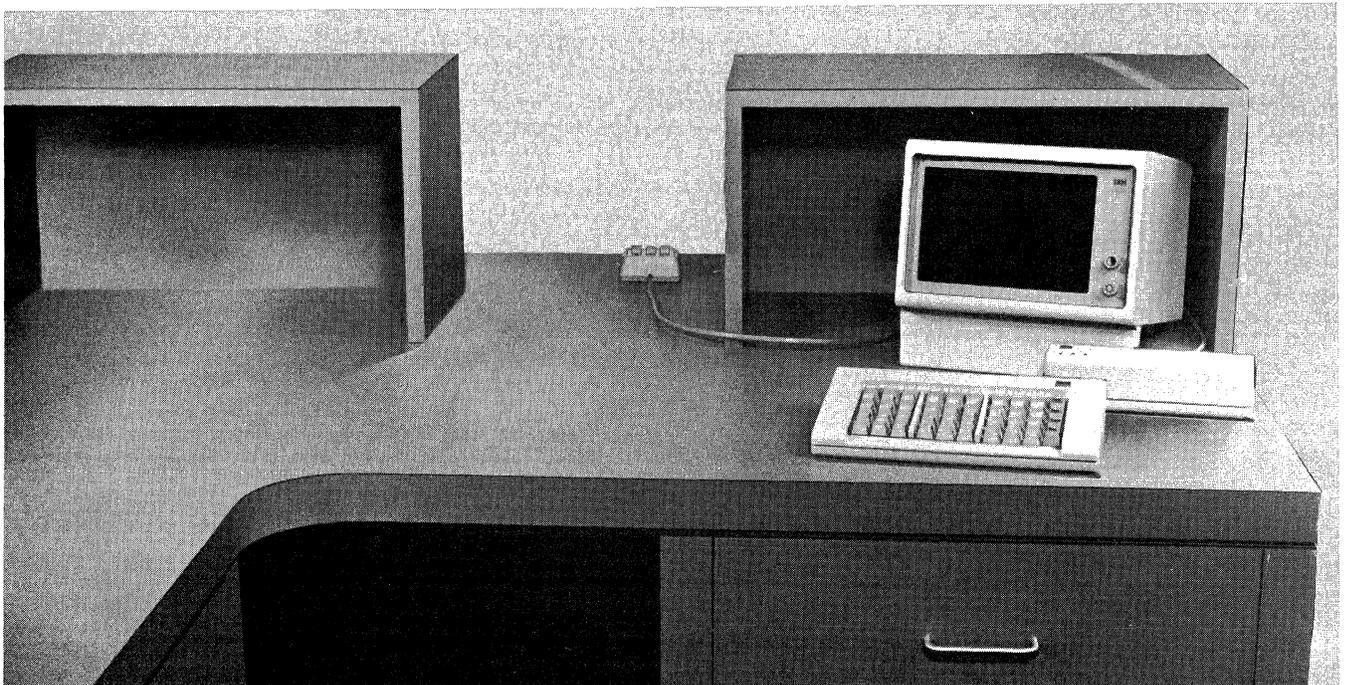
The basic teller work-station configuration includes:

- A display station, which consists of:
  - A display device (some have control modules)
  - A keyboard.
- A printer (this printer can also be shared with another work station).

The teller work station can also be expanded to include other devices such as:

- A magnetic stripe unit (reader or reader/encoder)
- A PIN keypad
- A second keyboard.

The placement of devices at a work station should provide convenience for the user. The more consideration given to the user's comfort and convenience, the more efficient the user can become at operating the devices and performing the associated tasks. Viewing distance, reach, and light reflection on displays are some of the considerations when setting up a work station.



**Figure 3-3. Basic Teller Work Station**



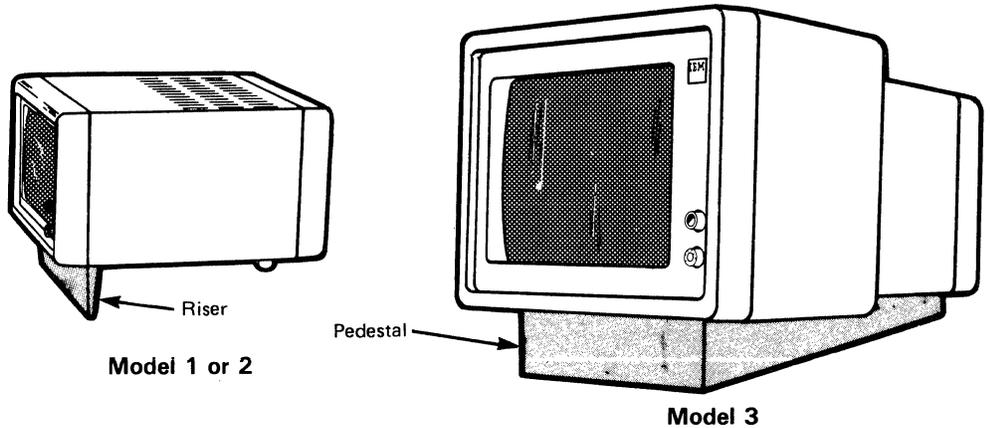
Figure 3-4. Basic Teller Work Station with the Control Module

***Placement of the Display Device:***

To help the user avoid unnecessary steps or leaning forward when viewing the display screen, you should place the display device at a comfortable viewing distance. Display devices have the following placement restrictions:

- The 4704 Display Station Model 1 is restricted by the 2-m (78-in) cable that attaches it to the control module.
- The other 4704 Display Stations are attached to the controller's device cluster adapter (DCA) port by a coaxial cable. Its placement of the display station is limited by the length you determine for the coaxial cable. This cable can have a maximum length of 1500 m (4920 ft).

When the display is set on the work surface, you can obtain an upward-vertical tilt by using a riser (for the 4704 Models 1 and 2) and a pedestal (for the 4704 Model 3).

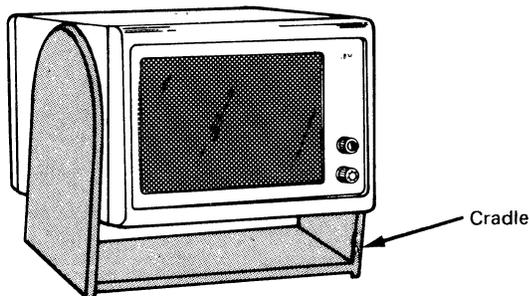


A teller can move the display device horizontally in any direction provided that no tension is applied to the cable. Chapter 6, "Machine Specifications," discusses the specifications and requirements for the display stations.

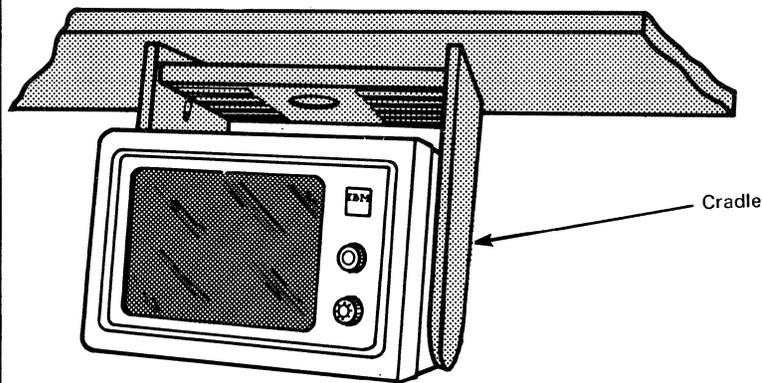
#### *Placement of the Cradle Accessory*

**Note:** This cradle cannot be used with the 4704 Display Station Model 3.

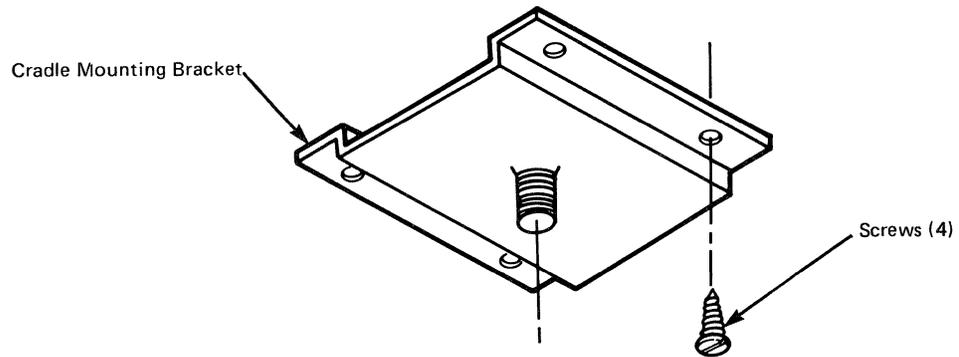
A cradle accessory is also available for holding the display device. You can place the display in the cradle and set it on the work surface to obtain an upward-vertical tilt of 0 to 30 degrees or a downward-vertical tilt of 0 to 25 degrees. This helps to eliminate excessive glare on the screen and provides operator viewing comfort.



You also have the option of mounting the 4704 Display Station Model 1 on an overhead shelf by using the cradle and the provided mounting bracket.



The mounting bracket has four holes that have a diameter of 5 mm (0.2 in). The size or type of screws and bolts for mounting the bracket depends on the material on which you will mount it. Thus, IBM does not ship screws or bolts with the cradle. Ensure that you obtain these screws or bolts before the cradle is delivered.



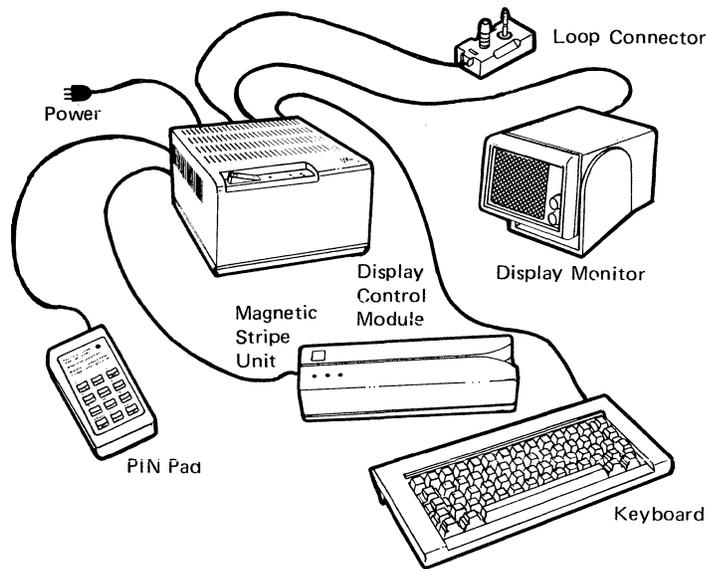
Cradle mounting instructions are in the *IBM 4704 Display Station Operating Instructions*.

The combination of the cradle and bracket allow for both vertical and horizontal movement of the display monitor. Minimum shelf heights of 330 mm (13 in) for the large screen monitor and 305 mm (12 in) for the smaller screen monitor are required. The minimum clearance in all directions from the pivot point, for rotating the small display monitor, is 208 mm (8-3/16 in). A large display requires 220 mm (8-3/4 in) of clearance from the pivot point. Other measurements for the cradle are shown under "Cradle for 4704 Displays" on page 6-18.

#### **Placement of Control Module**

**Note:** This information applies only for display stations containing control modules.

The 4704 Display Station Model 1 contains a control module. Each display station device has an individual cable that connects to the control module. The control module is connected to the loop. The display station devices include the display monitor, keyboards, magnetic stripe unit (reader or reader/encoder), and PIN keypad.



**Figure 3-5. Display Station Cabled to a Control Module**

The control module must be within reach of both a loop terminal port and a power-plug receptacle. It has a 2.1-m (82-in) cable for attaching to the loop. Power-cord lengths and plug types are listed in Appendixes C and D. The control module supplies the power and line signals to all display station devices attached to it.

You can place the control module on or below the teller work surface but, because of cable lengths, you must place it within 2 m (78 in) of the display station devices. If the control module is placed under a work surface, you might want to cut a 60-mm (2-3/8 in) hole in the work surface to route cables from the control module up to the work surface. The power-plug and loop-cable receptacles can also be placed under the work surface. In selecting where to place the control module, you must consider four things:

- Cables from the control module must reach display-station devices.
- Control module must be within reach of a power outlet and loop terminal port.
- Control module indicators and power switch must be accessible to the operator.
- Control module must be placed upright, with at least 102 mm (4 in) of space above the unit to allow for cooling.

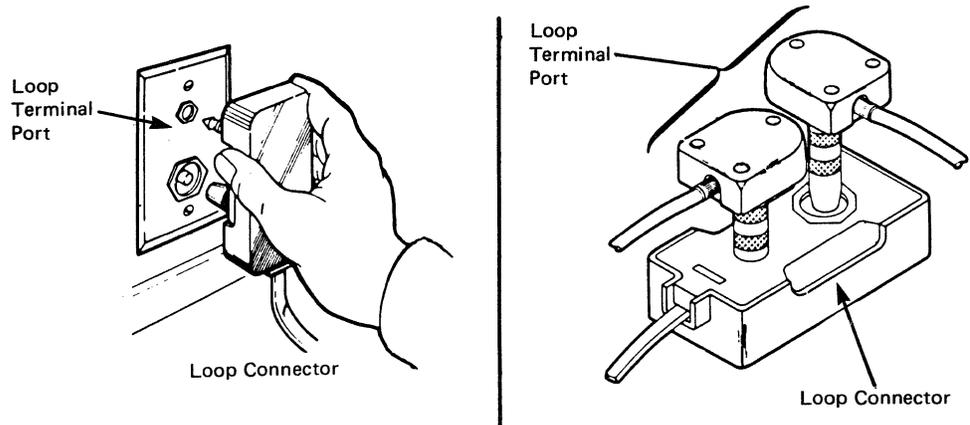
***Placement of Other Devices at Teller Work Station:***

The keyboard and magnetic stripe reader are placed on the work surface within comfortable reaching distance for the operator. Place the PIN keypad within a convenient reaching distance for your customer. The placement of all these devices is limited by the 2-m (78-in) cable length. Chapter 6, "Machine Specifications," provides the specifications and requirements for all work station devices.

**Placement of Printer:**

Each teller work station can have its own printer, or two tellers can share a printer. The printer should be positioned within comfortable reach for the convenience of the user(s).

The printer is connected to the loop independent of the display station. You must provide a separate loop terminal port for the printer. Each printer is equipped with a 2.1-m (82-in) cable with a connector for attaching to the loop terminal port. The following illustrates the loop terminal ports used by the printers and other loop devices:



There must also be a power receptacle within reach of the printer; refer to Appendix C and D for power cord information. Chapter 6, "Machine Specifications," contains clearances and other printer specifications.

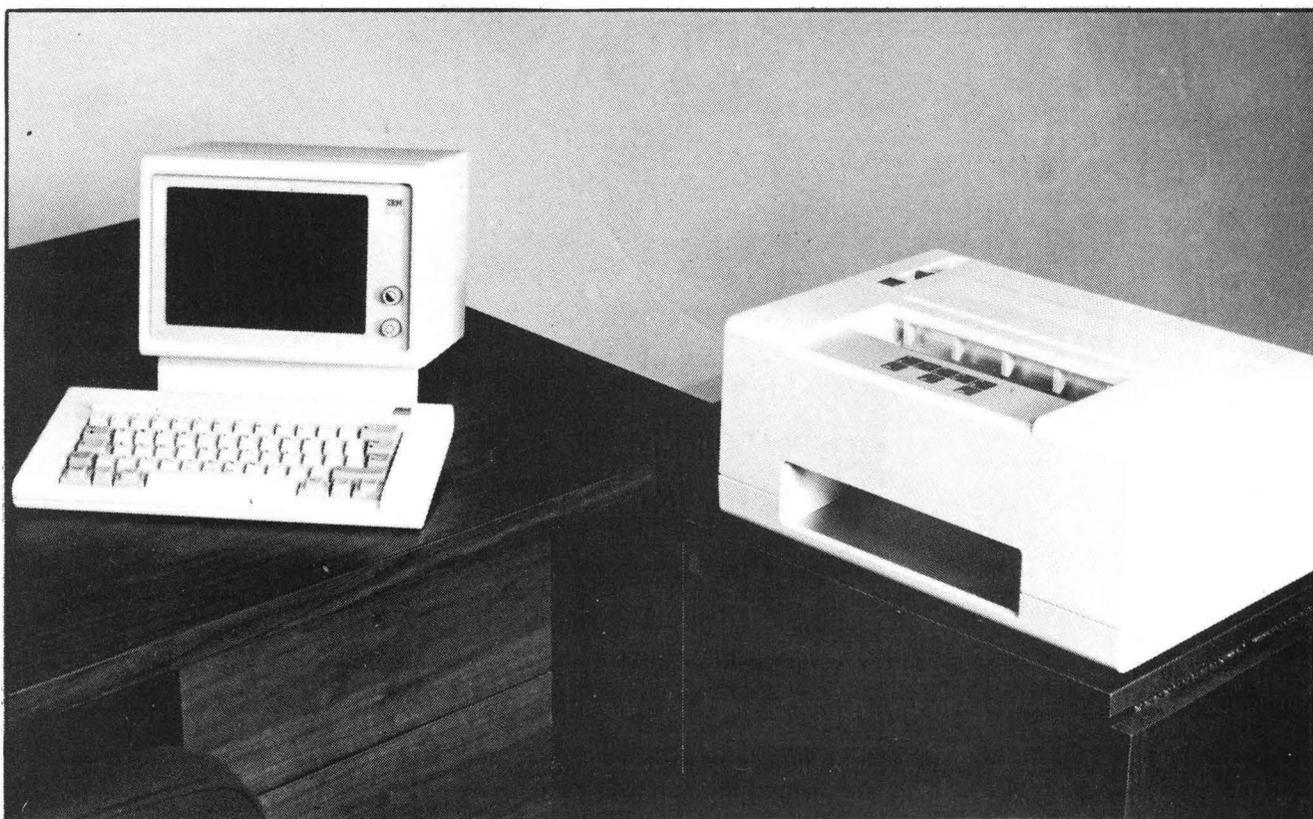
### ***Administrative Work Station:***

The basic administrative work station consists of:

- A display station, which consists of:
  - A display device (some have a control module)
  - A keyboard.
- A printer.

The display device is placed on the work surface behind the keyboard and usually to one side, so the operator has a good view of the customer. You should place the display and keyboard within easy reach and viewing distance for the operator.

When the display device is placed on the work surface, you can provide greater viewing comfort by tilting it up about 12.5 degrees with a riser. The cradle accessory also provides an upward-vertical tilt of between 0 and 30 degrees.



**Figure 3-6. Basic Administrative Work Station with Printer**

For 4704 Model 1, the control module must be within 2-m (78-in) cable length of the display station devices. It can be placed on the work surface or next to the desk on a small table. It *must* always be placed upright with the appropriate clearance above the unit to allow for cooling. Also ensure that the power switch and indicators are accessible to the operator. Place the unit in a position where it will not be easily bumped or pushed.



Figure 3-7. Basic Administrative Work Station with Control Module

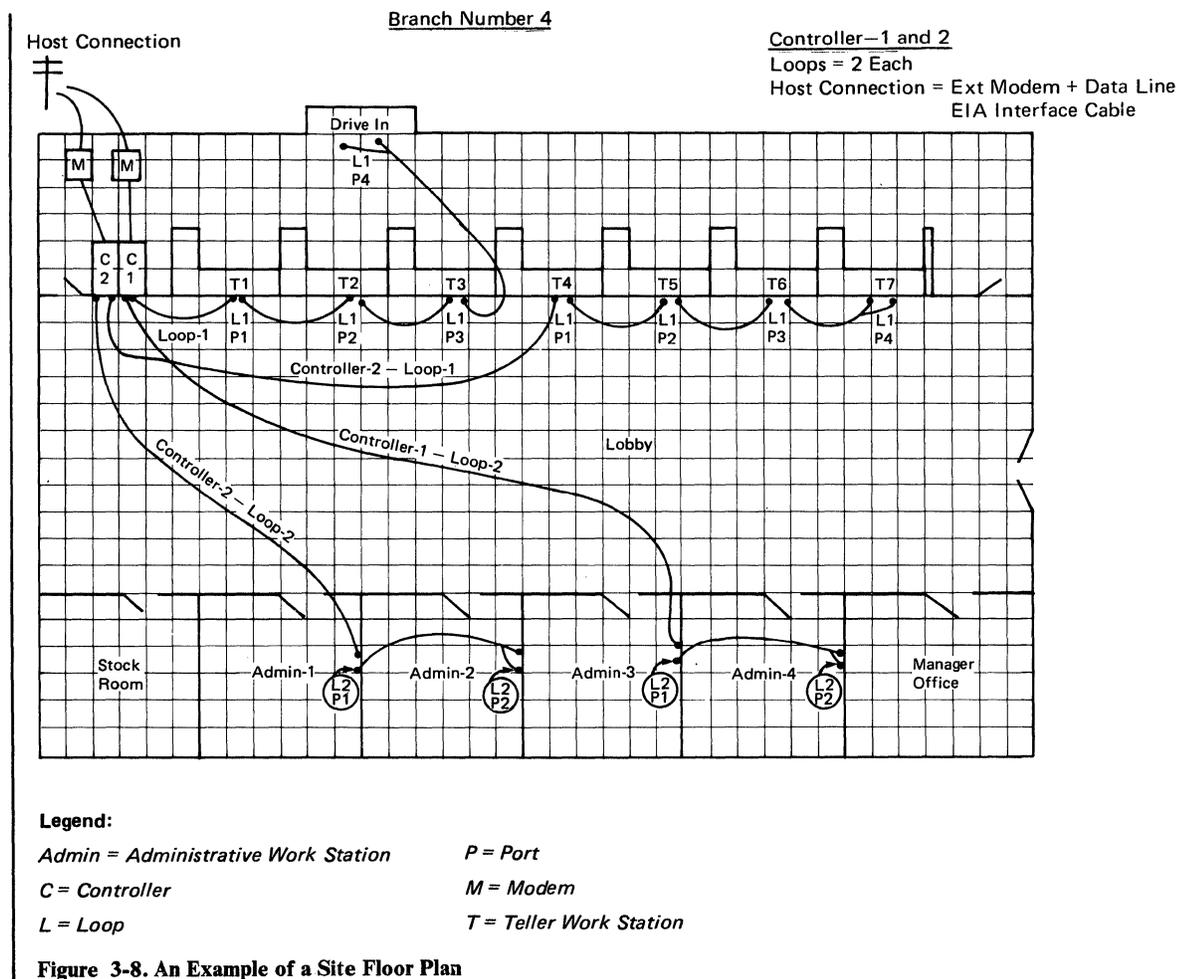
### 3. Design a Site Floor Plan

You should prepare a floor plan that promotes the most efficient work flow with operator comfort and safety. It should identify the layout of the lobby area, work-station locations, and the placement of controllers and modems. The actual placement of devices at a work station were discussed in step 2 of these "Preliminary Tasks." The floor plan is essential when you are estimating cable requirements for each site. You can also use the site floor plan during cable installation.

A site floor plan should include:

- A drawing showing the layout of the system area
- The type of host link to use
- The location of controller(s) and modems
- The location of each work station
- The cable (loop and DCA) routing throughout the branch
- Any remote loops attached to a site controller.

An example of a site floor plan is shown below:



## ***Tasks That Begin Six Months Before Setup***

### **1. Complete Design of Structural Changes**

You should complete site design changes to have your contractors complete the work before the scheduled installation of the 4700 system.

Site structural design changes to the branch lobby, teller work station, and administrative work-station areas are generally considered when the floor plan and work-station layouts are first planned. Before performing site electrical or mechanical changes, refer to "Site Preparation Recommendations" on page 3-16.

If you plan to use the wall-plate assembly loop terminal ports (described in Chapter 5), consider the placement of each port as part of your design. You should consider this because 4700 terminal devices attach to the loop through a 2.1-m (82-in) cable. In all designs, give careful consideration to the power outlet requirements for each work station. Ensure enough power outlets are within reach of each work-station device (refer to Appendixes C and D for power-cord and plug information).

### **2. Determine Cabling Needs and Source of Purchase**

Chapter 5, "Cabling Information," provides all the information for identifying the cable and connector requirements of any site. If you plan to purchase your cable from IBM, you should place your order at least ninety (90) days before your planned cable installation date. If you plan to purchase your cables and connectors from a vendor, ensure that the items are available and obtain a scheduled delivery date. The delivery date is important because you should begin installing cable about three months before setup.

### **3. Schedule Installation of Communication Lines**

If the site controller requires a common carrier data link to the host system, you should make arrangements now with the common carrier company. Also, make arrangements for any remote loop data lines. It will be to your advantage to have this line installed and checked out before setup and installation begins at the site. Read Chapter 4 for information on "Communication Facilities."

### **4. Begin to Assemble a Setup Team**

You should assign people for terminal setup and subsystem installation according to your needs.

### **| *Tasks That Begin Three Months Before Setup***

1. Begin site alterations and cable installation.

When you begin the alterations at your site, ensure that:

- All power requirements are met, including placement of power receptacles within reach of work-station devices.
- Identification labels are placed on:
  - Work stations
  - Loop terminal ports
  - Power receptacles.

2. Verify communication line installation schedule.

We advise you to check with the common carrier company to verify the installation of the communication line.

3. Install and check the cable wiring.
4. Order supplies and accessories.

You should order supplies and accessories for the new incoming equipment at least 60 days in advance. Request assistance for your local IBM marketing representative.

### **| *Tasks to Begin Two Weeks Before Setup***

1. Test the communication link to host system.

You should check the data link between the host and branch sites before setup in the branch begins. This ensures a smoother setup and installation of your 4700 system.

2. Train a setup team.

Terminal setup does not require special training, but IBM recommends that you provide an overview of the devices to the people who will set them up. Step-by-step instructions come with each device that show you how to set it up. For subsystem installation your team should be able to use the system monitor, understand a subsystem (host, controller, loops, and DCA) and be given an overview of what will be done during subsystem installation. Overview information can be found in the *IBM 4700 Finance Communication System: System Summary*.

## | Site Preparation Recommendations

### | *Product and Environment Safety*

Safety is carefully considered in the design of IBM products. Environmental safety is the customer's responsibility. Consider the following factors:

1. Provide for disconnecting the power service supplying the branch circuits that service the equipment.
2. Ensure adequate fire protection.

### | *Product Environment*

Unless otherwise noted in Chapter 6, "Machine Specifications," the environmental requirements for temperature and humidity are as shown in Figure 3-9. Humidity limits for the various supply products (forms and cards) are usually more restrictive than for the devices in which they are used. When operating near the maximum operating conditions, you should place the supplies (for at least 48 hours) in the environment of the associated device.

<b>Operating Environment:</b>		
Temperature:	10° to 41°C (50° to 105°F)*	
Rel Humidity:	8% to 80%	
Max Wet Bulb:	27°C (80°F)**	
<b>Nonoperating Environment:</b>		
Temperature:	10° to 52°C (50° to 125°F)*	* The upper limit of air temperature should be derated 0.6°C (1°F) per 76 m (250 ft) of elevation above 914 m (3000 ft).
Rel Humidity:	8% to 80%	
Max Wet Bulb:	27°C (80°F)**	** The upper limit of wet bulb temperature should be derated 0.6°C (1°F) per 152 m (500 ft) of elevation above 305 m (1000 ft).
<b>Storage Environment:***</b>		
Temperature:	0.6° to 60°C (33° to 140°F)	*** Storage requirements for accessories such as tapes and disk packs are defined in the <i>System/370 Installation Manual—Physical Planning</i> .
Rel Humidity	5% to 80%	
Wet Bulb:	0.6° to 29°C (33° to 85°F)	
<b>Shipping Environment:</b>		
Temperature:	-40° to 60°C (-40.0° to 140°F)	
Rel Humidity:	4% to 100% (including condensation, excluding rain)	
Wet Bulb:	0.6° to 29°C (33° to 85°F)	

Figure 3-9. Temperature and Humidity Requirements

In Figure 3-9, "Operating Environment" specifies the temperature and humidity limits that must be met before applying power to the equipment. "Nonoperating Environment" specifies the limits that can be tolerated when power is off.

Airborne particles, vapors, or gases can sometimes contaminate devices. If you suspect contamination, inform your IBM marketing representative during the early planning stages.

**Warning: 4700 controllers and terminals are cooled by either convection or fan-forced air. Do not obstruct the cooling vents on these machines.**

## | ***Electrostatic Discharge***

High static electrical charges can build up on people and furniture as a result of:

- People walking and/or moving carts, furniture, and other items across some floor covering (such as carpeting) .
- People rubbing certain furniture or seat covers.

Abrupt discharge of these static charges to metallic surfaces or to other people can cause discomfort and might cause interference with the operation of electronic equipment.

Some factors that contribute to electrostatic discharge are:

- High-resistance floor surface material
- Carpeting that does not have anti-static properties
- Plastic seat coverings
- Very low humidity
- Metal-frame furniture.

## | ***Electromagnetic Compatibility***

In some instances, the site chosen for the installation of a system can have high ambient electromagnetic fields. These fields can result from nearby radio-frequency sources such as transmitting antennas (AM, FM, TV, and two-way radio), radars (aviation and military), and certain industrial equipment (RF induction heaters, arc welders, and insulation testers).

If you think your site is exposed to high electromagnetic fields, consult your IBM marketing representative.

## ***Electrical Requirements***

### **Voltage and Frequency**

The devices of the 4700 system operate at 50 Hz or 60 Hz. The allowable frequency variations is  $\pm 0.5$  Hz. The machine specification pages list the single-phase voltages at which the 4700 system devices operate. The allowable voltage variations are listed in Appendix F. When you order the equipment, you must specify the voltage and frequency that will be available for each device.

## | **Power Cords and Outlets**

Each device of the 4700 system has a three-wire power cord that includes an equipment ground wire (green or green and yellow).

Plugs are shipped as indicated in Appendixes C and D.

- The U.S.A. and Canada receptacles and plugs are listed in Appendix C.
- The World Trade receptacles and plugs are listed in Appendix D.

The 3603 Terminal Attachment Unit and the Loop Repeater should be powered by a service that stays on 24 hours a day and is protected by a circuit breaker rather than a fuse.

## | **Branch Circuits and Grounding**

The individual branch circuits should be protected by suitable circuit protection, rated according to manufacturer specifications and applicable codes. Each protector should be labeled to identify the branch circuit it is controlling.

The power cords are equipped with a green or green and yellow ground wire. For safety, each branch circuit must be grounded. A dedicated wire conductor or a continuous metal conduit can be used to ground the equipment. In all cases, the ground must be carried back to earth or to another suitable building ground.

### **CAUTION**

**The power attachment cable plug (when supplied) is approved for use with these machines and meets the relevant testing laboratory or country/test-house standards. For user's safety, the plug must be connected to a properly wired and grounded receptacle. An improperly wired receptacle could place a hazardous voltage on accessible metal parts of the machine. The customer is responsible for receptacle wiring.**

## | ***Lightning Protection***

### | **Power Lines**

To provide lightning protection for equipment, IBM recommends that the customer ensure that all power sources are properly grounded and that all local codes are followed. This is a customer responsibility.

### | **Communication Lines**

IBM recommends that the customer ensure that lightning protection is provided on the common carrier lines. This is a customer responsibility.

### | **Signal Lines**

Station lightning protection is required when signal lines are run outdoors, either overhead or underground. See "Loop Lightning Protection" on page 5-42. This is a customer responsibility.

## Chapter 4. Communication Facilities

The major elements of each data communication link between remote sites are:

- At each site, a *modem* connects the communication channel and the data terminal equipment.
- A *communication channel* is usually supplied by a common carrier or by the Post Telephone and Telegraph Administration (PTT). The communication channel is a path for electrical data transmission between remote sites. A channel can consist of wire, radio waves, or both. At each site, the common carrier or PTT provides the connector that terminates the channel. The type and quality of the channel must conform to that required by the modem.
- Cabling connects the various pieces of equipment.

The customer must arrange for installation of communication equipment and services. These facilities must be available when the IBM equipment is scheduled to be installed.

### Modem Definitions

At a transmitting site, the modem converts data bits to signals suitable for transmission over the communication channel. At a receiving site, the modem converts the transmitted signals back to data bits.

An external modem attaches the 4700 controller to the host processor (located at a central site). 3603 Terminal Attachment Units attach 4700 work stations that are located at a remote site (remote loop).

### *IBM Modems Applicable to the 4700 System*

Remotely attached 4700 controllers require external modems. Modem types at both ends of the communication facility must be the same; they cannot be mixed. The modems in Figure 4-1 or their equivalents can be used.

Modem	Speed (bps)	Facility
3863	2400	Switched or nonswitched voice-grade lines
3864	4800	Switched or nonswitched voice-grade lines
3865	9600	Nonswitched voice-grade lines
3872	2400	Switched or nonswitched voice-grade lines
3874	4800	Switched or nonswitched voice-grade lines
5979-L41*	9600	Limited-distance privately-owned line
<b>Legend:</b> <i>bps = bits per second</i> * = available in certain World Trade countries only		

Figure 4-1. Modems

### ***PTT Modems***

In some countries, communication regulations mandate the use of PTT modems for certain types of communication services. In these cases, consult your IBM marketing representative to determine which modems are compatible with the 4700 system.

### **Termination Requirements**

All IBM modem devices used with the 4700 system are equipped with four-prong type 283B plugs for connection to the common carrier leased-line facilities and with a two-wire cable terminated in screw-type connectors for connection to a data access arrangement (DAA).

**Note:** Common carriers typically require that certain facilities be provided by the user to support equipment that they must install on the customer's premises. Included in these requirements are floor space and power outlets. Because requirements vary depending on the type and quantity of services provided, you should discuss the details of this subject with the common carrier well before you install your 4700 system.

### ***Host (Figures 4-2 and 4-3)***

Specify that all common carrier facility interfaces be terminated in a single four-prong jack, type 404B, 549A, 493A or equivalent.

### ***Modem Options***

Modem options available for user selection vary widely, depending on the specific modem selected. In view of the wide range of modems available, it is not possible to provide a list of recommended strapping options for specific modems. You should discuss the available options with your modem vendor, and rely on that vendor's recommendations whenever possible. The following information is

provided to guide you in selecting the appropriate options and represents the “preferred” selections for 4700/370X communication.

#### **Clear-to-Send Delay and Echo-Clamp (Receiver Unclamp) Delays**

Generally, you should set these delays shorter for full-duplex circuits and longer for half-duplex circuits. The clear-to-send delay should be longer than the echo-clamp delay.

#### **New Synch**

Not supported by 370X or 4700.

#### **Secondary Facility Capability**

Not supported by 370X or 4700.

#### ***NRZ/NRZI***

NRZI encoding is intended to provide sufficient line signal transitions during the transmission of long strings of zeros to ensure synchronization. You should use this mode of encoding whenever possible. However, certain modems, because of their modulation techniques, do not lend themselves to this mode of transmission. You should consult the modem vendor to determine whether you should specify NRZI encoding.

#### **Communication Channel Specifications**

The grade of communication channel to be specified to the common carrier in each case is:

- Basic type 3002 channel (schedule 4, type 4 in Canada) FDX (4-wire) facility
- Basic type 3002 channel (schedule 4, type 4 in Canada) HDX (2-wire) facility, or
- Normal-quality, voice-grade, leased-line facilities in the other World Trade countries; 2-wire HDX or 4-wire FDX, as required.

#### ***Host Link***

The communication channels to the host or central processor site can be either full-duplex or half-duplex channels.

#### ***Remote Loops***

Loop communication channels can be one full-duplex channel (for two-way communication with a single remote site) or two half-duplex (for one-way communication with two remote sites) channels.

## Common Carrier Facility Specifications

For *all* leased-line common carrier circuits, specify type 3002 voice-band private-line data facility or equivalent.

For switched network backup circuits (SNBU), specify data access arrangement (DAA) type CDT and type II *local loop* (Common carrier terminology, not to be confused with IBM 4700 loops.)

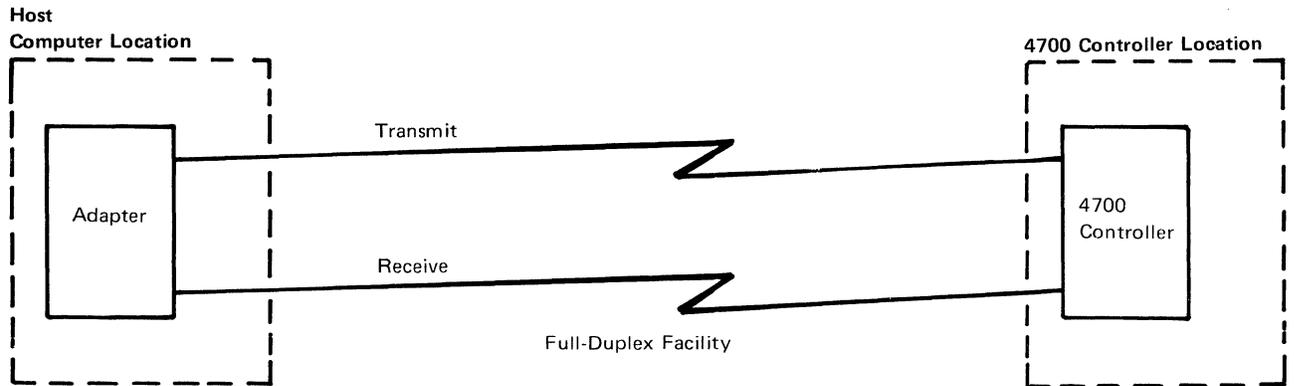
In addition to these common requirements, the following specifications must also be met for each facility, as appropriate.

### ***Point-to-Point Facilities (Figure 4-2)***

Specify a four-wire, full- or half-duplex, point-to-point facility between the desired locations, or specify a two-wire, half-duplex, point-to-point facility between the desired locations.

### ***Multipoint Facilities (Figure 4-3)***

Specify a four-wire, full-duplex, multipoint facility interconnecting all desired locations to the host computer.



A

B

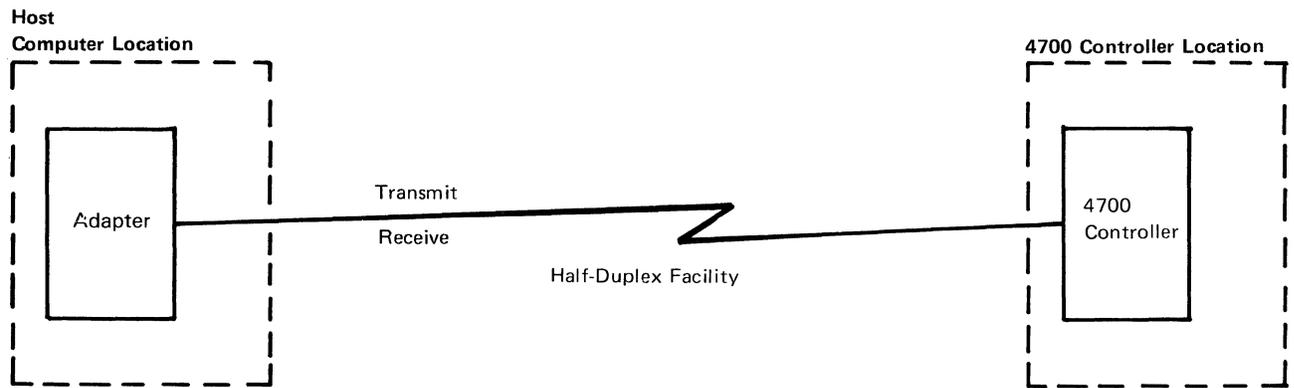


Figure 4-2. Point-to-Point Facilities

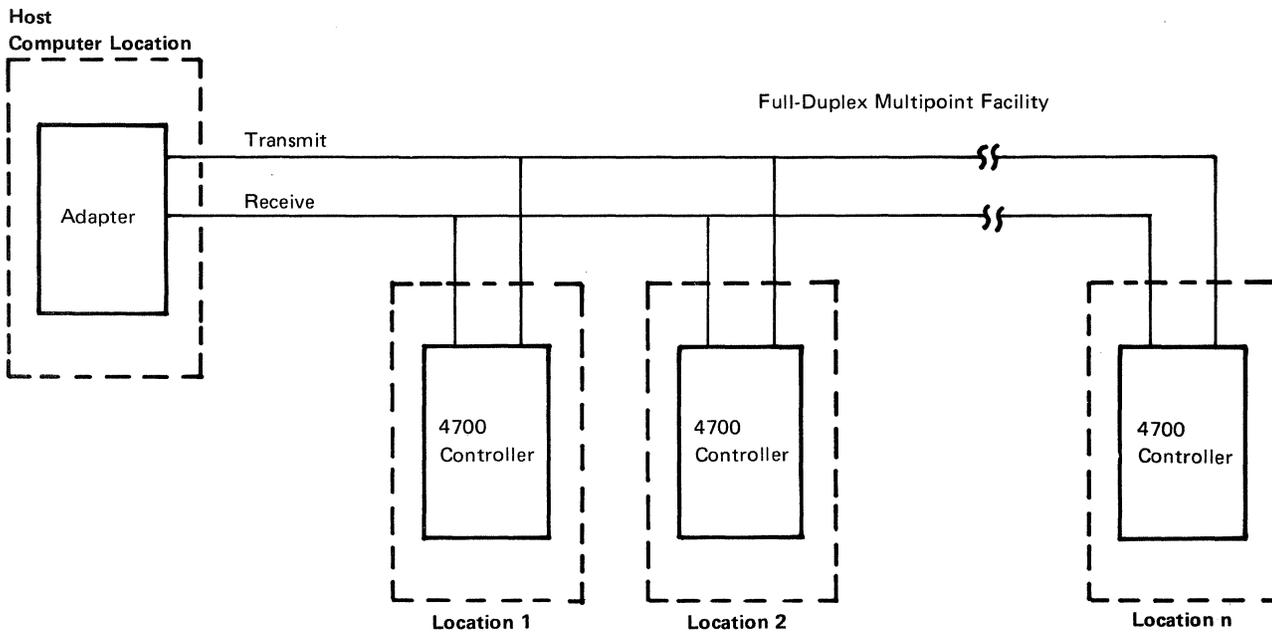


Figure 4-3. Multipoint Facilities

## | Chapter 5. Cabling Information

This chapter introduces you to the cabling information needed for your 4700 system.

The 4700 system uses three basic types of cables:

- **Host-link cables;** these cables connect the controller to the host data line.
- **Loop cables;** these cables connect the controller to the different work-station devices (such as printers and displays).
- **Device Cluster Adapter (DCA) cables;** these cables are used to carry data signals between the controller and individual DCA printers and displays.

We either guide you to, or provide the information needed for ordering and using the cables indicated above. Information concerning cables required for the host system or communication controllers (at the host site) are available in the installation planning manuals supplied with the host system and communication controllers.

### | Getting Started

We recommend that you work on cable requirements for one site at a time. Begin with the host-link cables, then loop cables, and then DCA cables.

When evaluating the cabling needs of your 4700 system, you should:

- Have the floor plan for the site being evaluated
- Prepare a cable inventory sheet for each site.

**Site Floor Plan:** When trying to determine the cable needs of a site, you should have the site floor plan. This floor plan should identify controller-to-host link and the loop routes throughout the site. The floor plan should also contain any remote loops that are attached to the site controller(s). The types of loops are defined later in this chapter.

**Cable Inventory Sheet:** Cable inventory sheets are required for each site. Use this sheet to keep account of the cabling needs for the site. Keep a separate inventory sheet for each 4701 controller. For examples of cable inventory sheets, see Figure A-3 on page A-3, and Figure A-4 on page A-4. A completed cable inventory sheet can be used for:

- Ordering the cables
- Preparing the cable labels
- Checking the cables when delivered.

### | Host-Link Cables

A host-link cable is used to attach the 4701 controller to a host system. The 4701 controllers are attached to host systems in two ways:

- Through a communication link
- By a direct cable connection.

We ship a host-link cable with each controller, which depends on the type of host-link feature you order.

### ***Host-Link Cabling Information***

On your site floor plan, you should identify how your 4701 controller attaches to the host system. The basic types of host-link attachments for 4701 controllers are:

- Standard EIA/CCITT attachment
- X.21 attachment
- Multiuse communication loop attachment (used in World Trade countries).

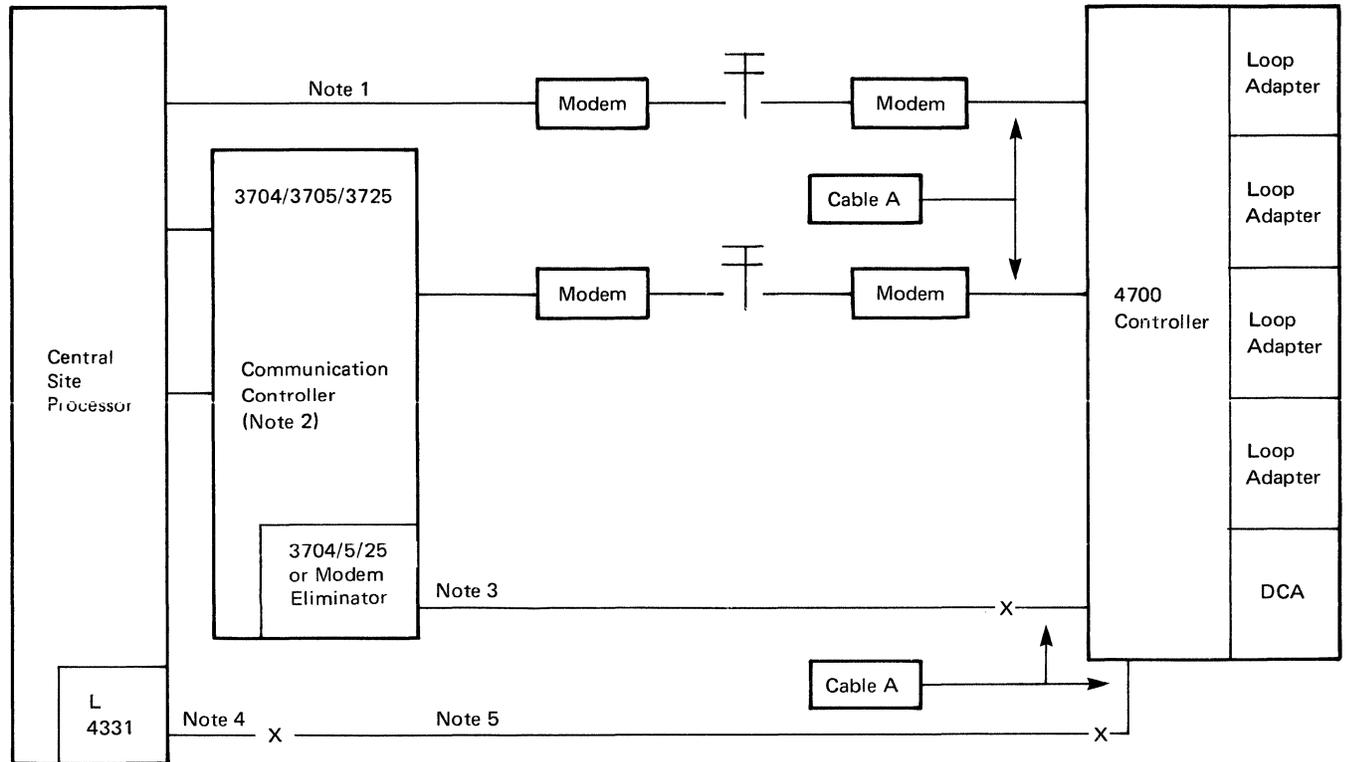
For information about the multiuse communication loop attachment, refer to *IBM Multiuse Communication Loop Planning Guide*, GA23-0038.

The cables for EIA/CCITT and X.21 type attachments are identified in Figure 5-1 and Figure 5-2. The following information is provided in the indicated figures:

- A drawing of the cable and connectors
- The cable part numbers
- The cable lengths
- The host systems that use the cables.

These diagrams identify the cable(s) that is shipped with your controller. Ensure that you record the host-link cable information on your cable inventory sheet for each site.

## Direct Connection and Communication Channel Links

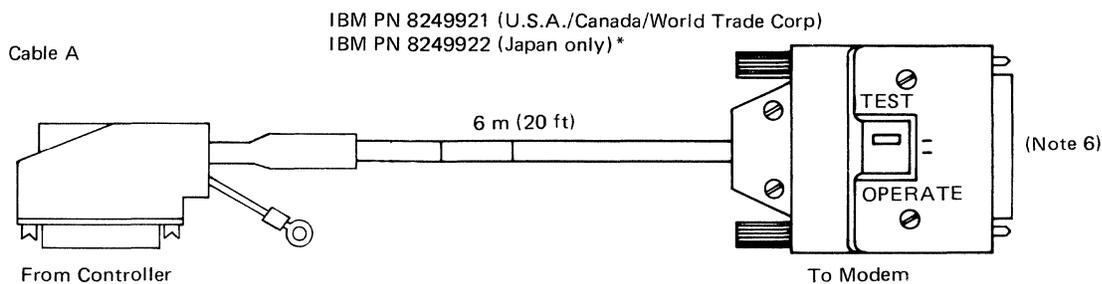


### Notes:

1. System/34 and 8100 only
2. System/370 and 4300 only
3. 3704, 3705, or 3725 RPQ, Local Attach Cable 30 m (100 ft) at speeds over 2400 bps, or modem eliminator.
4. 4331 Local Attachment cable, total length of all cables must not exceed:
  - 800 m (2625 ft) at 1200 bps
  - 400 m (1312 ft) at 2400 bps
  - 200 m (656 ft) at 4800 bps
  - 100 m (328 ft) at 9600 bps
5. Cable segment supplied by customer
6. A 0.3-m (1-ft) cable extender is supplied in U.K.  
U.K. = IBM PN 1743584

### Legend:

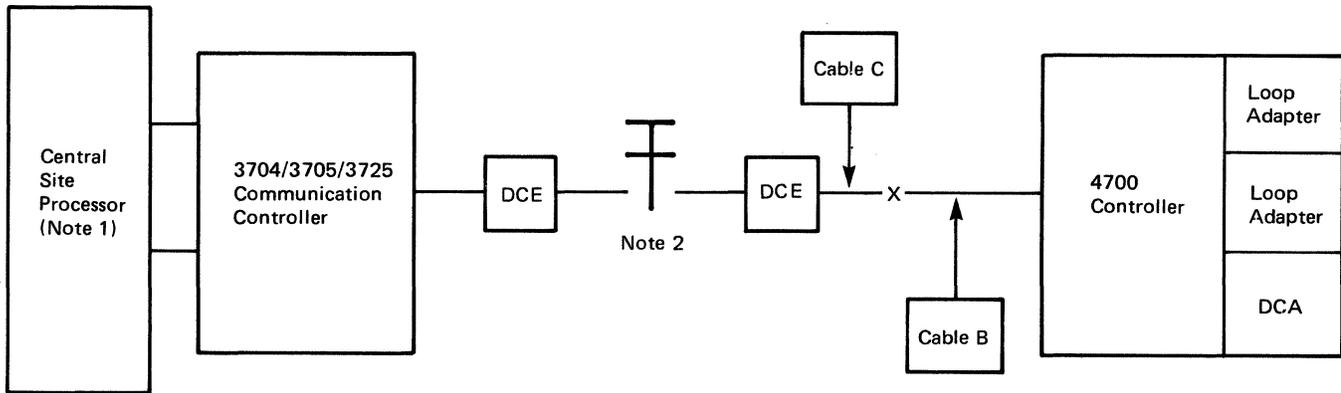
- A = IBM Cable PN 8249921 (U.S.A./Canada/World Trade Corp.)  
IBM Cable PN 8249922 (Japan)\*
- L = 4331 Local Attachment Feature
- X = Cable Connection



\*Also supplied with ASA screws for attachment to Non-Japanese manufactured modems.

Figure 5-1. Host Connections Using a Standard EIA/CCITT Connector

**Communication Channel Link**

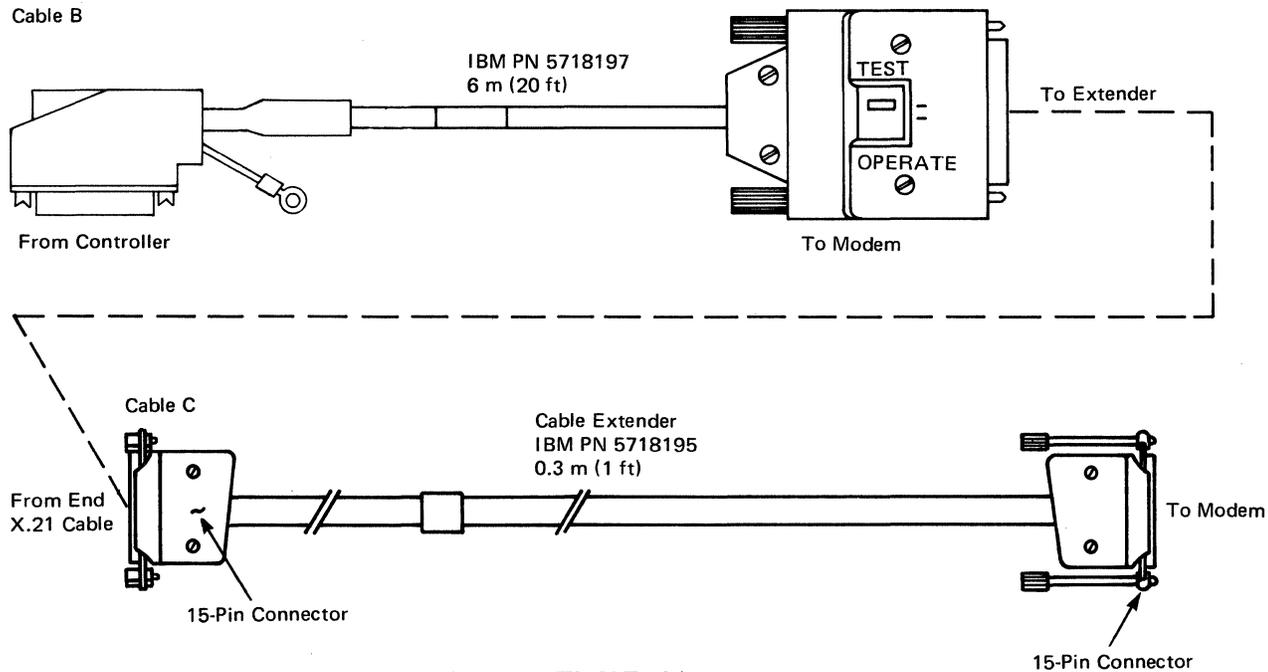


**Legend:**

- B = X.21 Leased or Switched Cable  
IBM Cable PN 5718197 —6 m (20 ft)
- C = IBM Cable PN 5718195 —0.3 m (1 ft)
- DCE = Data Communication Equipment
- X = Cable Connection

**Notes:**

1. System/370 and 4341 only.
2. Modems could be used here also.



**Figure 5-2. Host Connections Using an X.21 Connector (World Trade)**

## | Loop Cables and Accessories

This section describes loop cables:

- How they operate
- How they are configured
- Some limitations
- How to determine the cables and connector you need
- How to order them
- How to install them
- How to check them (after the installation).

Information on loop lightning protection is also available at the end of this chapter.

## | *Brief Introduction of Loops*

Loop attachment is one method by which terminals and other devices communicate with a 4700 controller. Loops serially carry information between a controller and all the terminal devices. The information flows in one direction. Terminal devices are attached to the loop by loop terminal ports (which are described later in this chapter).

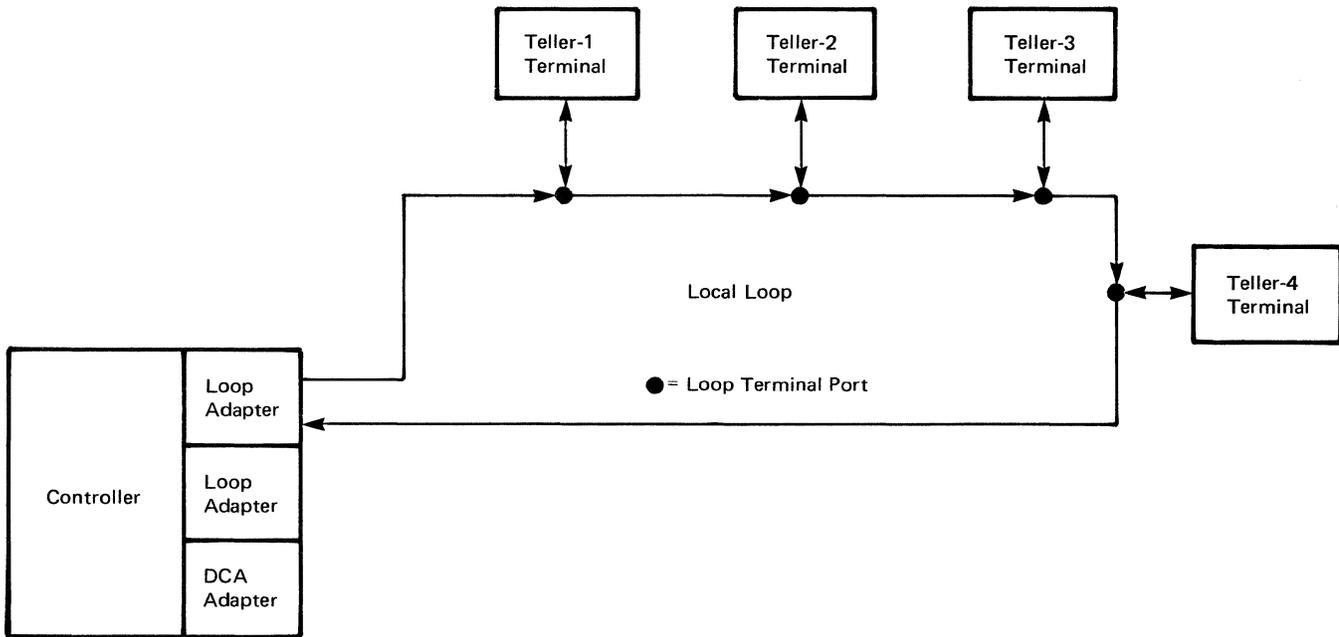
The customer is responsible for ordering, installing, and maintaining the loop cables and accessories.

There are two types of loops: (1)**local loops** and (2)**remote loops**.

- Local loops start and finish at the local site, attaching directly to the controller (using the appropriate cables and connectors) without the use of a common carrier.
- Remote-loop configurations are similar to local loops, except a common carrier line is used to connect the terminals and other devices that are at a different site (remote site) to the loop adapter on the local controller.

**Local Loop:**

The loop cable runs from the controller to each subsequent loop terminal port, until reaching the last loop terminal port on the loop, from which the loop cable returns to the controller.



**Figure 5-3. Example of Local Loops**

**Remote Loop:**

With this type of loop, the controller is attached to a local 3603 terminal attachment unit; this unit is attached to a common carrier line. At the remote site, another 3603 (which is also connected to the common carrier line) communicates with the controller at the local site (through the local 3603). The remote loop is configured like the local loop, except it starts and ends at the remote 3603.

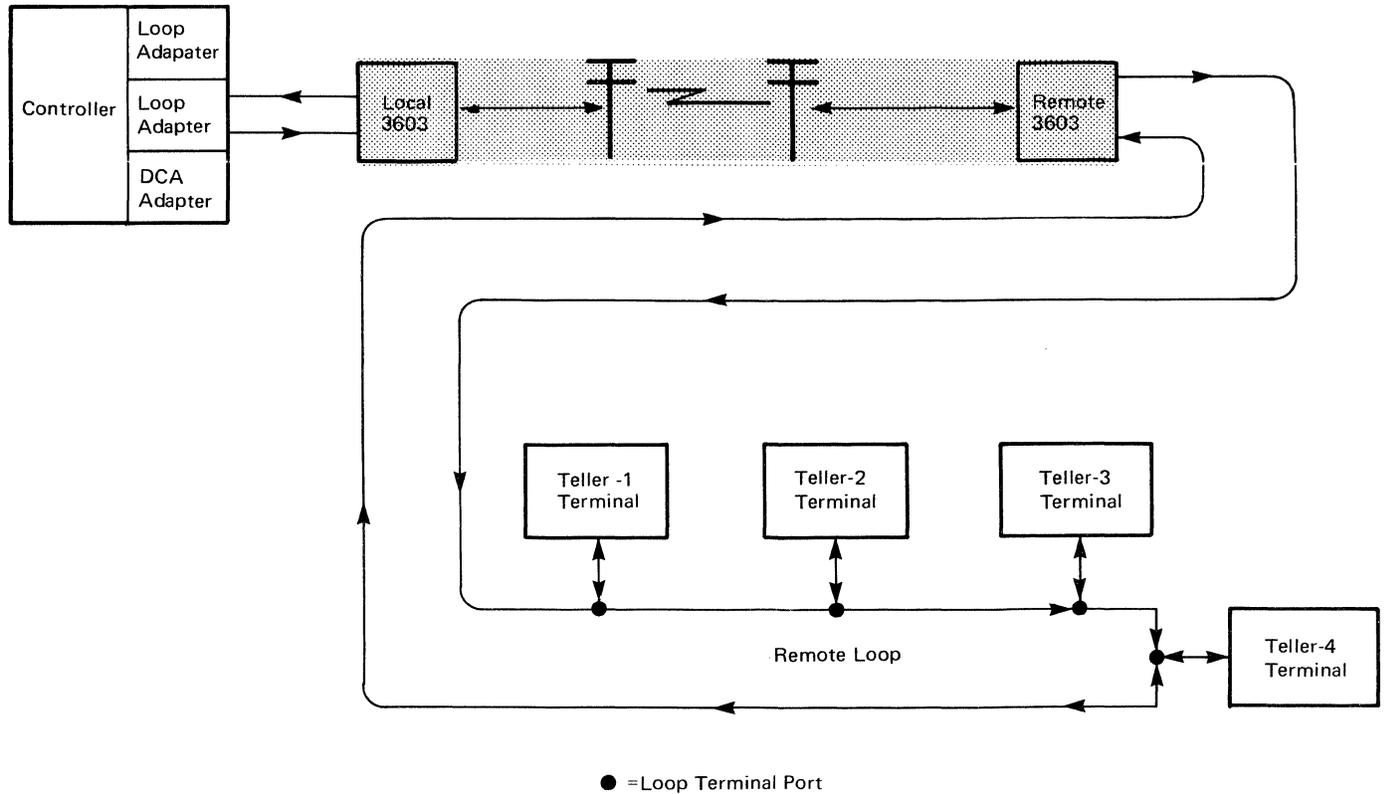


Figure 5-4. Example of Remote Loops

## | **Loop Components**

The components you need to build a loop are:

- Loop cables
- Loop terminal ports
- Loop repeaters.

## | **Describing Loop Cables**

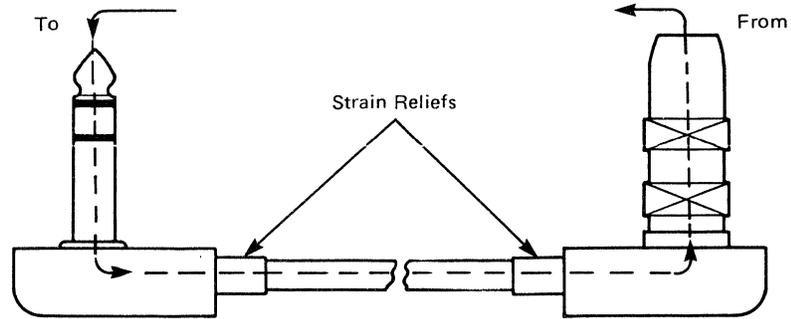
The loop cable is the vehicle that carries the communications and controls to and from the controller loop adapters and each attached terminal. The length of the loop cable between terminal ports is limited by the capability of the attached terminal device to drive the signal forward (to the next terminal port or back to the controller). Each terminal device (with power On) can drive the signal a maximum of 610 meters (2000 ft). When the terminal power is off, the terminal is automatically bypassed to maintain the loop integrity. This has the same result as removing the terminal device and connecting two segments of cable together. Therefore, to keep the loop operational, the sum of cable lengths between terminal devices (with power Off) *must not* exceed 610 meters (2000 ft) unless you use a loop repeater.

There are two types of loop cables: (1)two-conductor loop cables, (2)four-conductor loop cables. The following text and illustrations describe both loop cable types. We first describe the two-conductor cables, then the four-conductor cables. In each description, we provide IBM part numbers and we indicate cables for indoor and outdoor use. We also provide the cable key (an alphabetic character) for each cable. The cable keys are used to identify the cables.

**Two-Conductor Loop Cables:** Two-conductor loop cables carry the information in one direction (from source to destination). The two-conductor cables discussed here are also indicated in “The Cable Chart” on page 5-22.

IBM offers one preassembled two-conductor loop cable (part number 1563155). This cable comes with strain reliefs and shields.

| Cable Key = f

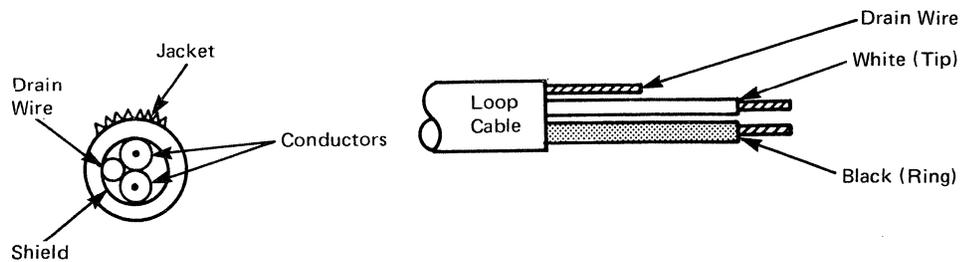


Maximum Length = 610 m (2000 ft)

IBM offers two types of bulk two-conductor loop cables (plugs, jacks, and strain reliefs must be ordered separately). Additional specifications for these bulk cables, are in Figure 5-12 on page 5-26.

1. Part number 5252769 (for indoor use)

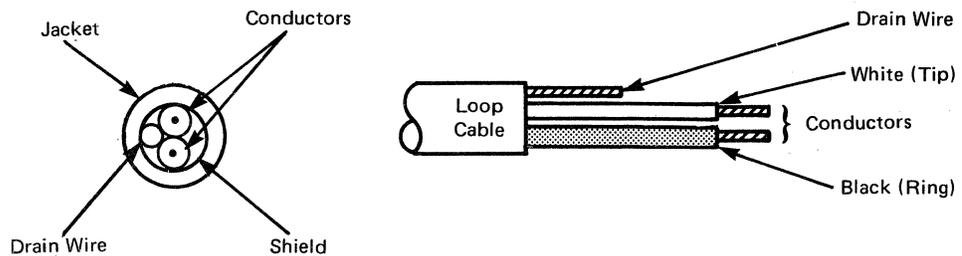
| Cable Keys = b, d, and f



This cable can be used with either the right-angle plug and jack connectors or the wall-plate connector assembly. For a description of these connectors, refer to “Describing Loop Terminal Ports” on page 5-11. This cable is also used to make common carrier cables.

2. Part number 5252920 (for outdoor use)

Cable Keys = f



This cable is designed for outdoor runs (both aerial and buried). This cable can also be used for cable runs within the same building. It is electrically interchangeable with the bulk cable part number 5252769 (two-conductor cable, described in the previous text) and part number 5252913 (four conductor cable, described in the following text). Because of the outside diameter of this cable, right-angle terminal port connectors cannot be used. You should use the wall-plate terminal port connectors (shown in Figure 5-6 on page 5-12).

The applications that require this cable are mostly outdoor runs:

- Buried (with or without conduit)
- Aerial
- Any cable run between buildings.

If you plan an outdoor run, also refer to the information under “Loop Lightning Protection” on page 5-42.

**Four-Conductor Loop Cables:** These cables contain two twisted pairs, which are effectively two two-conductor cables in one jacket. This cable can be useful with loops that are physical long straight runs. One cable (twisted pair) carries the outgoing information from the controller to each loop terminal port, and the second cable carries the information from the last loop terminal port back to the controller. The most appropriate type of connector for this type of cable is the wall-plate connector assembly with the self-restoring contact (shown in Figure 5-6 on page 5-12). The four-conductor cables discussed here are also indicated in “The Cable Chart” on page 5-22.

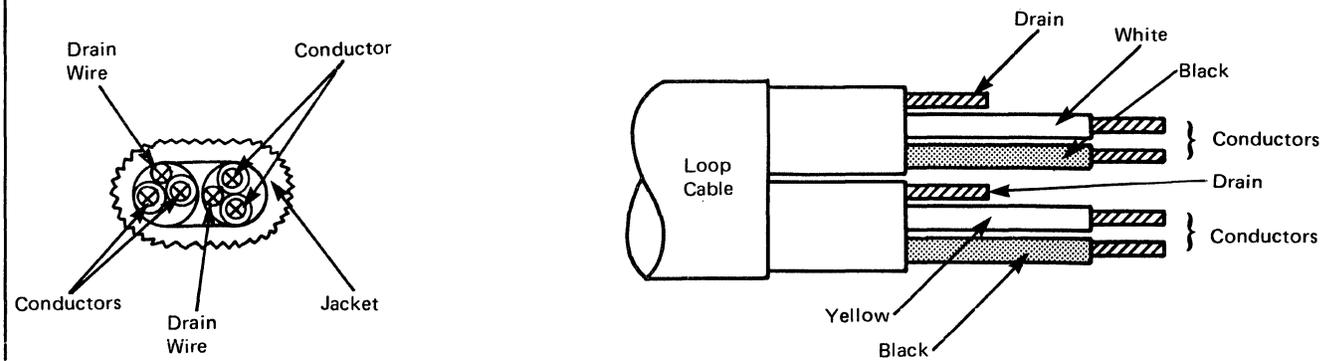
IBM offers two preassembled four-conductor cables:

- Part Number 1745348, which connects between a 3603 and a remote loop (Cable key = a).
- Part Number 1745372, which connects between a loop repeater and a loop terminal port (Cable key = g).

For a diagram showing these connectors, see Appendix B, Figure B-1 .

| IBM offers one bulk four-conductor cable, part number 5252913:

Cable Keys = a, b, g, and i



An example of how this cable is connected to the wall-plate terminal port is shown in Figure 5-19 on page 5-41.

Because each twisted pair within this cable is not covered with a separate jacket, effective strain relief cannot be readily achieved with the right-angle connectors (shown in Figure 5-5 on page 5-12). IBM does not recommend that you use right-angle connectors with four-conductor cables.

**Note:** When working with this cable, (making connections or installing connectors) ensure that insulation is between the twisted pairs. The twisted pair is separated by the shield, which is a Mylar<sup>1</sup> tape on the outside of aluminum/Mylar tape (for specifications, see part 2 of Figure 5-12 on page 5-26).

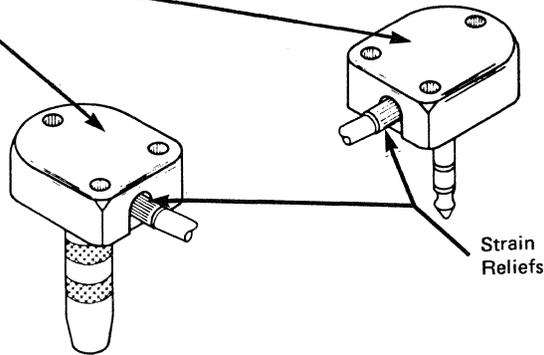
### | Describing Loop Terminal Ports

A loop terminal port is the connection point on the loop for the terminal devices (work stations). Each loop terminal port must have two connections: (1) a female jack (connected to the "From" or "Source" end of the cable), (2) a male plug (connected to the "To" or "Destination" end of the cable). IBM offers two types of loop terminal port connectors: (1) right-angle connectors, (2) wall-plate connector. Each type of loop terminal port is described in the following text.

<sup>1</sup> Trademark of E.I. duPont deNemours & Co., Inc.

### Right-Angle Connectors

- Part number 5252765, right-angle plug
- Part number 5252766, right-angle jack
- Part number 1561344, strain relief (2)

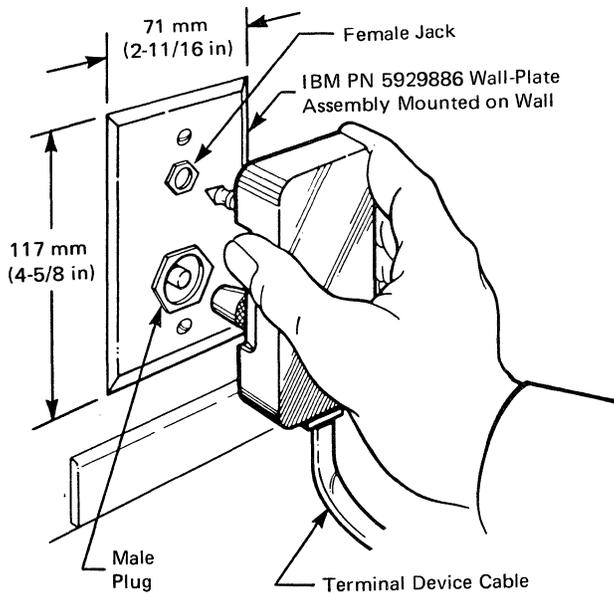


For right-angle connector specifications, see Figure 5-13 on page 5-28.

Figure 5-5. Right-Angle Loop Cable Connectors

### Wall-Plate Connector

- Part number 5929886, with self-restoring contact.

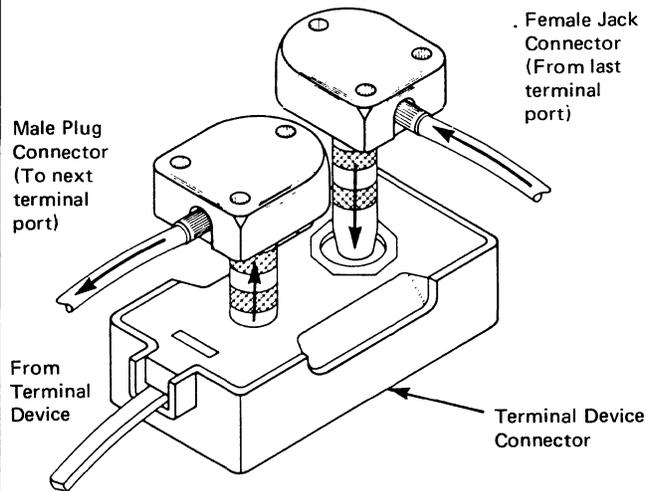


**Note:** Depth of the wall outlet box must be a minimum of 64 mm (2.5 in).

For wall-plate assembly specifications, see Figure 5-14 on page 5-30.

Figure 5-6. Loop Cable Wall-Plate Connector Assembly

All 4700 system devices are compatible with either type of terminal port with the exception of the controllers. Right-angle connectors and two-conductor loop cables *must* be used for attaching to the loop adapters on the back panel of the controller. Other devices that connect to a loop are equipped with a 2.1-m (82-in) cable and connector (see Figure 5-7) that is compatible to either type of loop terminal port connector. The connector types you use depend on the type of cable you purchase (two-conductor or four-conductor) and how you plan to run your cables (concealed or surfaced).



**Figure 5-7. Right-Angle Loop Connectors Attached to a Terminal Device Connector**

Preassembled loop cables include the right-angle plug and jack connectors. You can also attach these connectors to bulk cable. If you plan to assemble right-angle connectors to bulk cable, ensure that you also attach strain reliefs. Attach one strain relief to each right-angle jack and plug connector.

The wall-plate connector assembly (with the self-restoring contact) includes a jack and plug as part of an integral unit (Figure 5-6). It fits a standard electrical box (minimum depth = 64 mm (2.5 in) and can be placed into a wall partition and used as a permanently mounted loop terminal port. The self-restoring contact provides loop integrity when a terminal device is removed from the loop.

## Describing the Loop Repeater

A Loop Repeater (IBM part number 4400002) contains circuitry that allows a 610-m (2000-ft) extension in loop cable. The diagram shown in Figure 5-8 illustrates a local loop using the loop repeater. Loop repeaters can extend both the incoming and outgoing loop cables. You can add up to 5 loop repeaters to a loop, which extends the loop by 6096 m (20000 ft), which would equal the maximum loop length of 6706 m (22000 ft).

**Note:** On a loop, do not use the terminal devices power-on time to perform the loop repeater function.

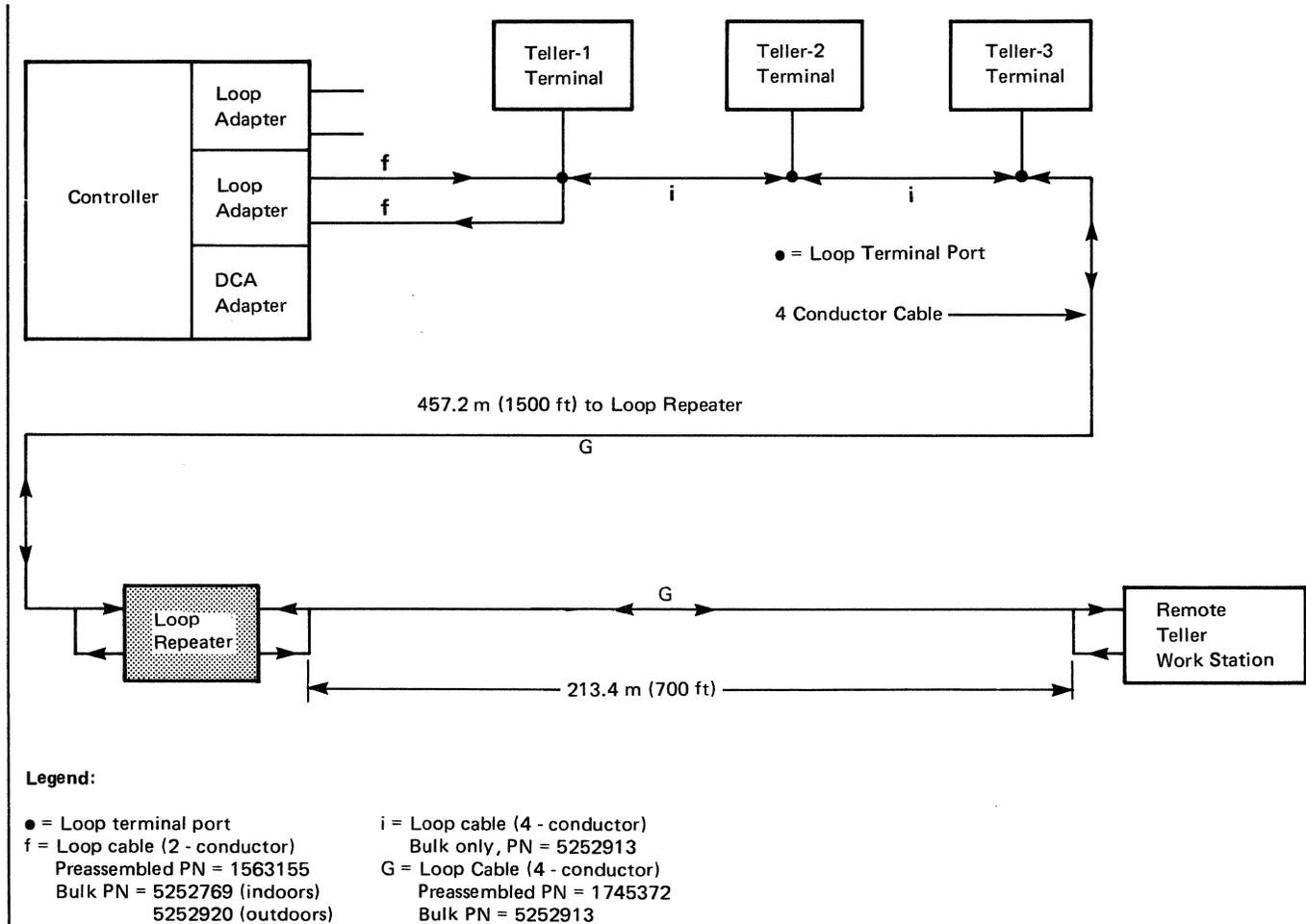


Figure 5-8. Example of a Loop Requiring a Loop Repeater

## **| *Determining Your Loop Cable and Connector Needs***

This section provides a guide for determining your loop cable and connector needs. We recommend that you work on cable requirements for one site at a time. This evaluation should be done after you have determined your host-link requirements.

When evaluating the cabling needs, you should:

- Have the floor plan for the site being evaluated
- Have cable inventory sheets to prepare for each site.

## Local Loop Cable and Connector Needs

This section helps you determine your local loop cable needs. Details about purchasing loop cables and the other loop components are covered under "Purchasing Loop Cables and Connectors" on page 5-21. Figure 5-9 illustrates two examples of how you can run cables for a local loop.

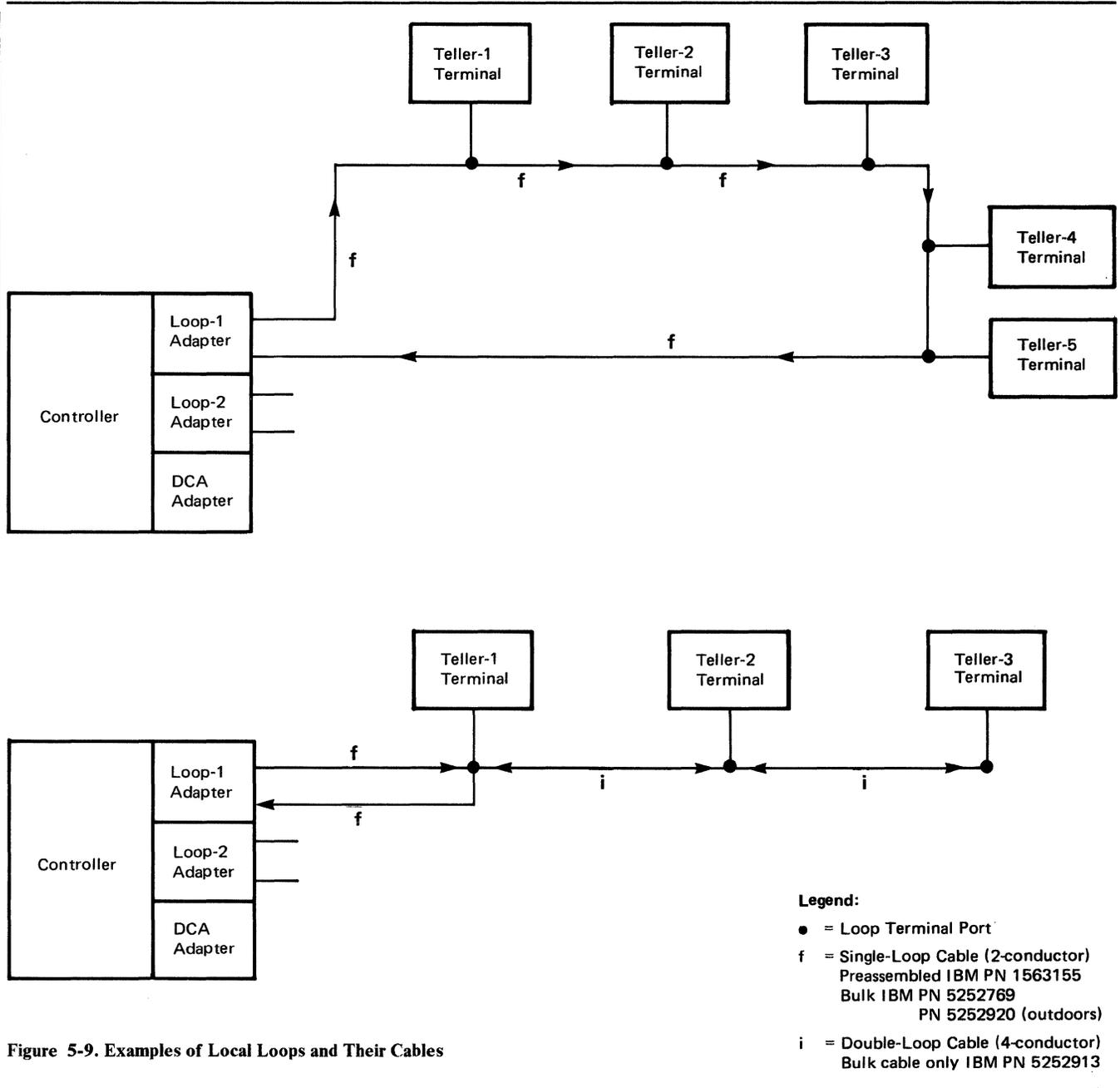


Figure 5-9. Examples of Local Loops and Their Cables

When identifying your local loop cable needs, you must:

1. Identify the route for each loop.

This information should be on the site floor plan. Compare the local loops on your site floor plan with the local loops in Figure 5-9 on page 5-16 . Use this figure to help identify IBM part numbers for cables and connectors.

2. Identify the type of loop terminal ports you will use and their location. Also, identify the locations of the teller and administrative work stations throughout the site.

This information should be on the site floor plan. For details on the types of loop terminal ports, refer to “Describing Loop Terminal Ports” on page 5-11. Record the loop terminal port information on your cable inventory sheet.

3. Measure the distance from the start of the loop (controller loop adapter), around the loop (to/from each loop terminal port) to the last loop terminal port.

**Notes:**

- a. If you use two-conductor cable, you also need to measure the distance between the last loop terminal port back to the controller.
- b. If you use four-conductor loop cable, you need to measure from the first loop terminal port back to the controller loop adapter, because only two-conductor cable with right-angle connectors can be connected to the controller.

The type of loop cable used for local loops is indicated in Figure 5-9 on page 5-16 . On the cable inventory sheet, list the cable key for the cables you select. Measuring details are as follows:

- 1) Determine the type of loop cable you will purchase before measuring. You should also indicate this information on the cable inventory sheet.
  - **Preassembled cable**; this cable includes connectors and is ready for use. This type cable also requires more accurate measurements; so ensure your measurements are accurate before placing an order.
  - **Bulk cable**; with this type of cable, you have to assemble the connectors and strain reliefs.
- 2) Measure the loop cable in segments. A segment is the required length of cable between loop terminal ports.
- 3) After each segment is measured, you should fill in the cable inventory work sheet with the measurements and all the other indicated information. An example of a cable inventory sheet is shown in Appendix A, Figure A-4.

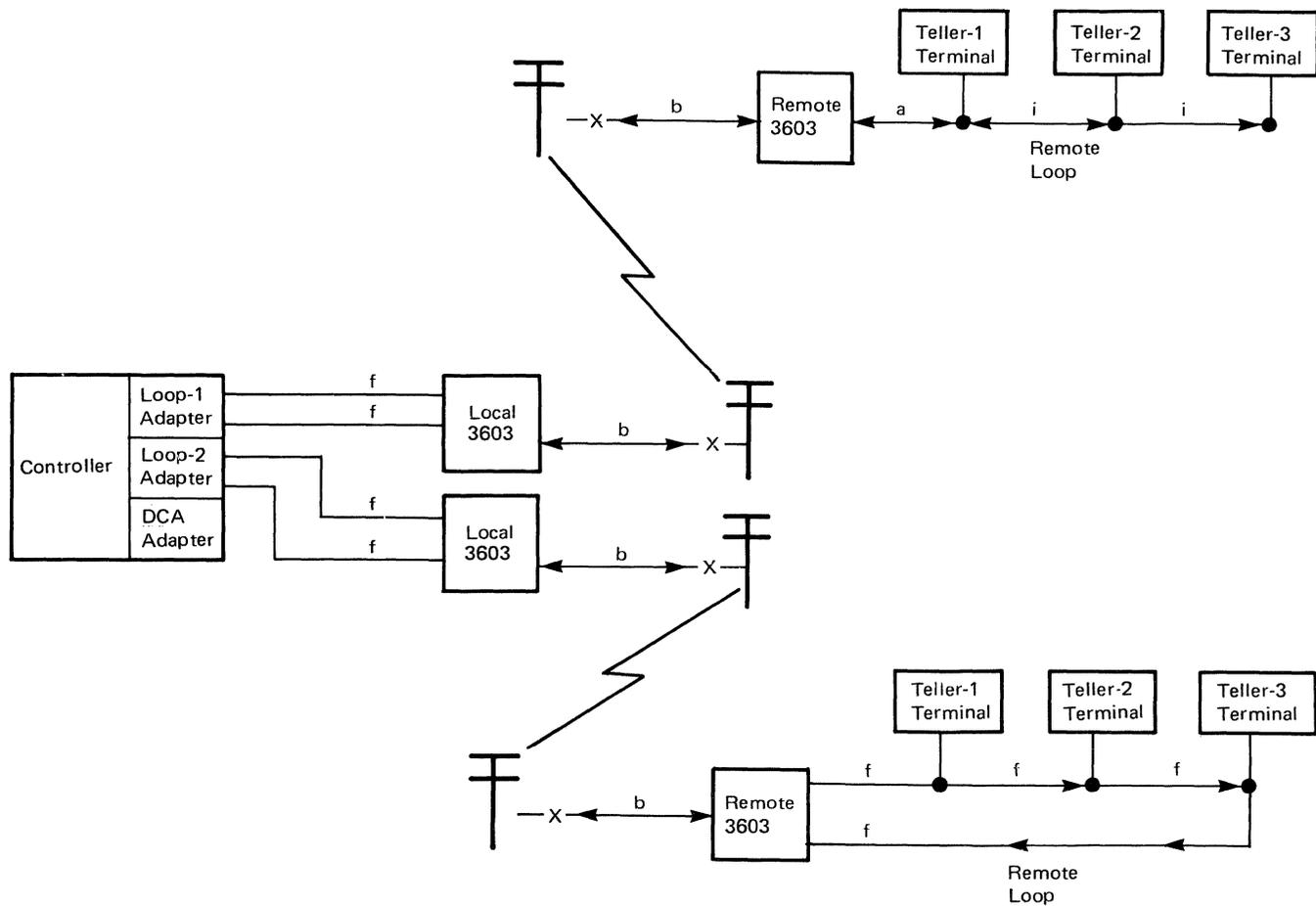
**Note:** “The Cable Chart” on page 5-22 is very helpful when filling in the cable inventory sheet.

4. Determine where you intend to order your loop cable (from IBM or outside IBM), then refer to “Purchasing Loop Cables and Connectors” on page 5-21 for details. Your cable inventory sheet should contain all necessary ordering information.

**Note:** It is also necessary to fill in your *Loop Layout Form*, (see Appendix A, Figure A-5, and Figure A-6 ). This form is used later for subsystem problem determination.

#### | Remote Loop Cable and Connector Needs

This section helps you determine your remote loop cable needs. Details about purchasing loop cables and the other loop components are covered under “Purchasing Loop Cables and Connectors” on page 5-21. Figure 5-10 illustrates an example of how you can run cables for a remote loop.



**Legend:**

- a = Double Loop Cable (4-conductor)  
Preassembled IBM PN 1745348 (3603 to remote subloop only)
- b = Communication Cable  
Preassembled has cable ends designed to fit all 3603 Models
- f = Single Loop Cable (2-conductor)  
Preassembled IBM PN 1563155  
Bulk IBM PN 5252769

- i = Double Loop Cable (4-conductors)  
Bulk only IBM PN 5252913
- X = Cable Connection
- ⎓ = Communication Lines
- = Loop Terminal Port

**Figure 5-10. Example of a Remote Loop and the Cables Required**

When identifying your remote loop cable needs, you must:

- Identify the route for the remote loop.

This information should be contained on the site floor plan. Compare the remote loops on your site floor plan with the remote loop in Figure 5-10 on page 5-19 . Use this figure to help identify IBM part numbers for cables and connectors.

To help describe the cables needed to build your remote loop, we use the cable keys (defined in the legend) shown in Figure 5-10 on page 5-19 .

**Note:** Ensure that you carefully measure the length for each cable before ordering. As indicated under “Local Loop Cable and Connector Needs” on page 5-16, you should measure loop cable in segments.

Details for the cables and connectors discussed here plus additional remote loop cabling details are in Appendix B, “Remote Loop Diagrams,” and “The Cable Chart” on page 5-22.

As you determine your remote loop cabling needs, record the information on your cable inventory sheet.

1. Starting at the controller, two “f” cables are needed to connect the 3603 to the controller loop adapter.
2. Two “b” cables are needed; one to connect the *local* 3603 to the common carrier line and the other to connect the *remote* 3603 to the common carrier line.
3. One “a” cable or two “f” cables are needed to connect between the remote 3603 and the first loop terminal port (at the remote site).
4. At the remote site, the remote loop is built the same as the local loop, except you have the option of using cables “a” or “f” cables to connect between the remote 3603 and remote loop.

The cables are run and measured the same as for local loops. The “f” or “i” cables can be used to build the remote loop.

After the remote loop cables and connectors have been defined, measured, and recorded on the cable inventory sheet, you are ready to order. Determine where you intend to purchase your cable (from IBM or elsewhere), then refer to “Purchasing Loop Cables and Connectors” on page 5-21 for details.

## **| Purchasing Loop Cables and Connectors**

This section contains the information for ordering loop cables and connectors from **IBM** (through your IBM marketing representative via MES). You can also purchase the loop cables and connectors from a vendor of your choice. If you choose to purchase your cables from a vendor, the cables must conform to the cable specifications under “Specifications for Bulk Cable” on page 5-25.

Your loop cable and connector needs should be listed on your cable inventory sheet. You can purchase bulk cables (with connectors and strain reliefs ordered separately) or preassembled cables (with connectors already attached).

1. When ordering preassembled cable, ensure that the cable segments are measured accurately before placing an order.
2. When ordering bulk cable:
  - Add the segments of cable that have the same part numbers.
  - To ensure enough cable is available, we recommend that you add 10% to the total amount of bulk cable. This compensates for errors in measuring and waste when cutting and trimming cable for adding connectors.

“The Cable Chart,” on the next page, contains the necessary details for ordering both bulk and preassembled cables from **IBM**. The type of information contained in this chart includes:

- Cable keys; these keys were also used in diagrams.
- The source connection (From) for each cable (controller, loop terminal port, modem).
- The destination connection (To) for each cable, (loop terminal port, modem, common carrier).
- Part numbers for bulk cables, preassembled cables, and connectors.
- Type of connector on both ends of the cables.
- Special notes.

## The Cable Chart

Cable Key	From	To	Preassembled Cable PN	Bulk Cable PN	Connectors
a	3603	Remote Loop	1745348 (Note 1)	5252913 4-conductor (Note 1)	<i>From:</i> 1745363  <i>To:</i> Hardwire
b	3603-1	Common Carrier Leased line	1745350 (Note 2)	5252913 4-conductor (Note 2)	<i>From:</i> 4 rings  <i>To:</i> WE 283B plug
b	3603-2	Modem	4474809 8-conductor (Note 3)	---	<i>From:</i> 8 rings  <i>To:</i> EIA/CCITT connector
b	3603-3	Common Carrier Leased line	4400029 4-conductor (Note 4)	---	<i>From:</i> 5 rings  <i>To:</i> 4 rings
b	(Note 5)	(Note 5)	1741656 (Note 5)	5252769 2-conductor	<i>From:</i> WE404B jack <i>To:</i> WE283B plug
b	(Note 6)	(Note 6)	1727744 (Note 6)	---	<i>From:</i> 25-pin jack <i>To:</i> 25-pin plug
d	3603-1	DAA	1745349 (Note 7)	5252769 2-conductor (Note 7)	<i>From:</i> 3 rings <i>To:</i> 2 rings
f	Controller or Loop Terminal Port	Loop Terminal Port	1563155 (Note 8)	5252769 2-conductor (Note 8)	<i>From:</i> 5252765 <i>To:</i> 5252766

Figure 5-11 (Part 1 of 2). Cable Chart

Cable Key	From	To	Preassembled Cable PN	Bulk Cable PN	Connectors
f	Loop Terminal Port	Loop Terminal Port	---	5252920 2-conductor (Note 9)	<i>From:</i> 5929886 <i>To:</i> 5929886
g	Loop Repeater	Loop Terminal Port	1745372 (Note 10)	5252913 4-conductor (Note 10)	<i>From:</i> 6 rings <i>To:</i> 1745363
i	Loop Terminal Port	Loop Terminal Port	---	5252913 4-conductor (Note 11)	<i>From:</i> 5929886 <i>To:</i> 5929886

Figure 5-11 (Part 2 of 2). Cable Chart

**Notes:**

1. Cable **a** (Part numbers 1745348 and 5252913), the maximum length is 7.6 m (25 ft). Details for these cables are shown in Appendix B, Figure B-1 .
2. Cable **b** (Part numbers 1745350 and 5252913), the maximum length is 7.6 m (25 ft). Details for these cables shown in Appendix B, Figure B-2, Figure B-7, Figure B-8, and Figure B-9.
3. Cable **b** (Part number 4474809), the length is 2.1 m (82 in). Details for this cable are shown in Appendix B, Figure B-2 and Figure B-6 .
4. Cable **b** (Part number 4400029), the length is 2.1 m (82 in). Details for this cable are shown in Appendix B, Figure B-2 .
5. Cable **b** (Part numbers 1741656 and 5252769); this is a common carrier adapter cable. For details concerning these cables and how they are used, see Appendix B, Figure B-3.
6. Cable **b** (Part number 1727744); this is a UK modem adapter cable. For details concerning this cable and how it is used, see Appendix B, Figure B-3.
7. Cable **d** (Part number 1745349), the maximum length is 7.6 m (25 ft). Details for this cable are shown in Appendix B, Figure B-5 .
8. Cable **f** (Part numbers 1563155 and 5252769), the maximum length is 610 m (2000 ft). Bulk specifications are contained in Figure 5-12 on page 5-26. For a description of these cables, see "Two-Conductor Loop Cables" on page 5-9.
9. Cable **f** (Part number 5252920), the maximum length is 610 m (2000 ft). Bulk specifications are contained in Figure 5-12 on page 5-26.

10. Cable g (Part number 1745372) the maximum length is 7.6 m (25 ft). Bulk specifications are contained in Figure 5-12 on page 5-26. Other details for this cable are shown in Appendix B, Figure B-2 .
11. Cable i (Part number 5252913), the maximum length is 610 m (2000 ft). Bulk specifications are contained in Figure 5-12 on page 5-26. Other details concerning the use of this cable are shown in Figure 5-19 on page 5-41.

#### **|Purchasing Loop Terminal Port Connectors**

|If you are ordering bulk loop cables, you also need to order the appropriate loop terminal port connectors. "The Cable Chart," on the preceding page, identifies the IBM recommended terminal port connectors for the particular cable type. A description of each terminal port type is under "Describing Loop Terminal Ports" on page 5-11.

## Specifications for Bulk Cable

Figure 5-12 gives the specifications for the bulk cables that can be ordered from IBM. Variations to these specifications may be made when obtaining an equivalent cable from other sources, provided that:

1. The cable consists of one or two twisted pairs of NO. 22 AWG, 0.3335 mm<sup>2</sup>, (or larger) copper conductors.
2. A maximum attenuation of 4.5 db/305 m (1000 ft) at 100 kHz.
3. The characteristic impedance is no less than 50 or greater than 65 ohms at 1 MHz.
4. Mutual capacitance no greater than 47 nf/305 m (1000 ft) at 1 kHz.
5. The shield specifications of aluminum polyester tape of 100% coverage or equal are met.
6. If the outside diameter (OD) varies from the IBM cable specifications, the strain relief (part number 1561344) will not function as intended. Therefore, you must consider other means for cable strain relief.
7. When an “equivalent” cable is selected, it is the customer’s responsibility to see that it complies with applicable codes.

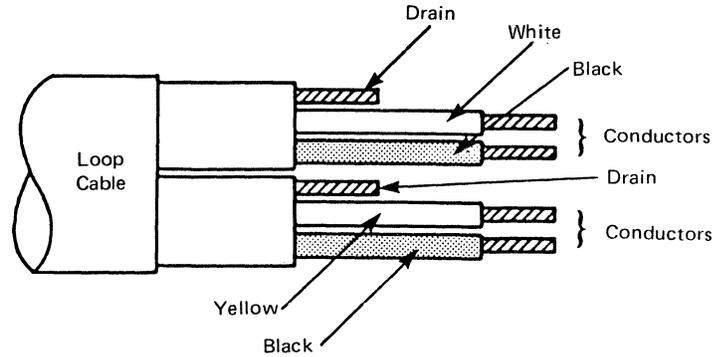
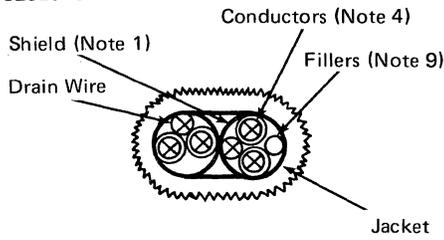
Diagram References	b	d,f	b	a,g,i	Note 8
<b>IBM Part Numbers</b>	<b>4474809*</b>	<b>5252769</b>	<b>1745350*</b>	<b>5252913</b>	<b>5252930</b>
<b>Cable Details</b>					
Number of Conductors	11	2	4	4	2
Shield(s)	1	1 (Note 2)	1	2 (Note 1)	1 (Note 2)
Outside Diameter		4.57 (0.180)		4.44 x 7.1	4.95 (0.195)
Mandrel Radius (Note 3)		25.4 (1.0)		25.4 (1.0)	50.8 (2.0)
<b>Cover</b>					
Material	PVC	PVC	PVC	PVC	PVC
Nominal Thickness	1.58 (0.062)	0.889 (0.035)	0.889 (0.035)	0.889 (0.035)	1.02 (0.040)
Color		White		White	Black
<b>Individual Conductors</b>					
Wires	No. 24 AWG	No. 22 AWG (Note 4)	No. 22 AWG (Note 5)	No. 22 AWG (Note 4)	No. 22 AWG (Note 4)
Insulation Material	PVC	SR-PVC	PVC	SR-PVC	PVC
Material	PVC	SR-PVC	PVC	SR-PVC	PVC
Nominal Thickness	0.305 (0.012)	0.229 (0.009)	0.229 (0.009)	0.229 (0.009)	0.305 (0.012)
Color (Note 6): Wire 1	—	Black	Red	Black	Black
2	Brown	White	White	White	White
3	Blue	—	Black	Black	—
4	White	—	Yellow	Yellow	—
5	—	—	—	—	—
6	Red	—	—	—	—
7	Orange	—	—	—	—
8 8	Yellow	—	—	—	—
9	Pink/Blue	—	—	—	—
10	Black	—	—	—	—
11	Violet	—	—	—	—
12	Pink	—	—	—	—
UL Style, Primary Conductors	—	1061	1061	1061	1095
UL Style, Cable	—	2464	2464	2464	(Note 7)

\*IBM preassembled number; cable not available from IBM in bulk.

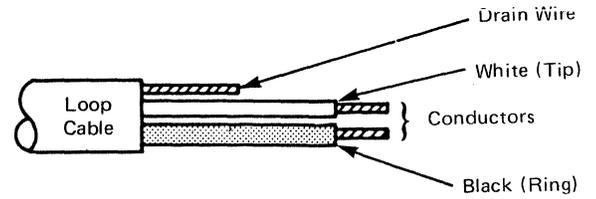
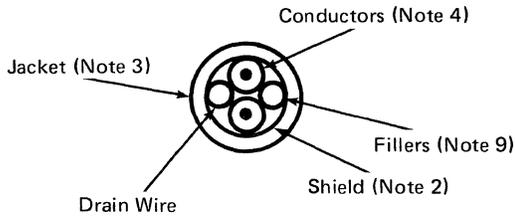
Dimensions are shown in millimeters (and inches).

**Figure 5-12 (Part 1 of 2). Bulk Cable Specification Chart**

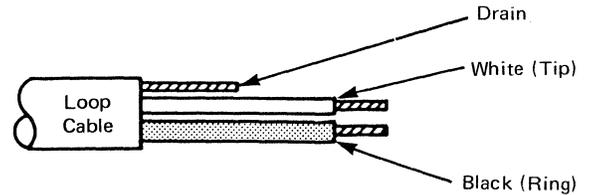
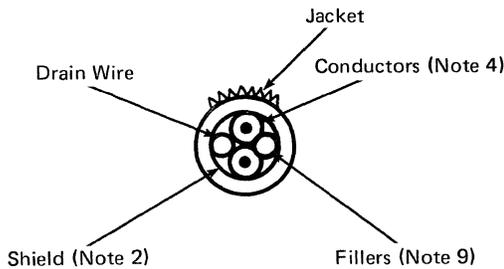
**IBM PN 5252913**



**IBM PN 5252920 (Outdoor)**



**IBM PN 5252769**



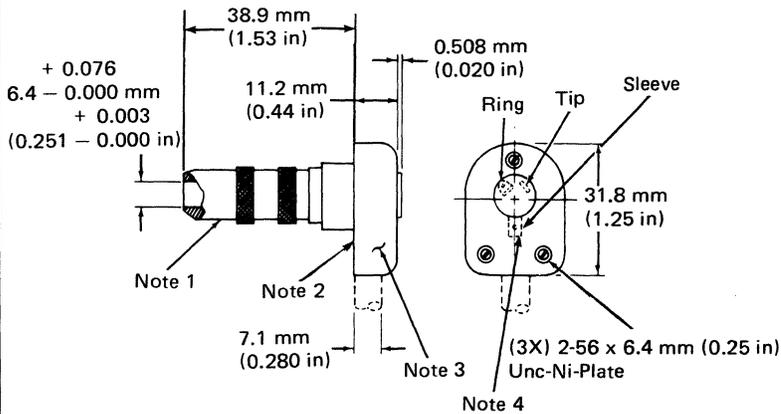
**Notes:**

1. Shield: Mylar aluminum foil with 25% minimum overlap. Aluminum side against the drain wire.
2. Shield: Aluminum polyester tape with 10% minimum overlap and a No. 22 AWG, (7/30 stranding), tinned copper drain wire.
3. Jacket: Compound must meet minimum requirements for underground feeder and branch circuit cable, UL subject 493, and must also be weatherproof and sunlight resistant.
4. Conductors: Tinned copper, No. 22 AWG, 0.3255 sq. mm (7/30 stranding).  
Wires 1 and 2 to be twisted together with a 31.8 mm (1.25 in) left-hand lay.
5. Conductors: Tinned copper, No. 22 AWG, 0.3255 sq. mm (7/30 stranding).  
Wires 1 and 2, and wires 3 and 4, to be twisted together with a 31.8 mm (1.25 in) left-hand lay.
6. Only eight conductors are used in preassembled cable PN 1649115.
7. Cable must be labeled in accordance with UL for low-energy cable.
8. Cable PN 5252920 is electrically interchangeable in this system with cables PN 5252769 and PN 5252913.
9. Fillers as required to effect circular cross-section.

**Figure 5-12 (Part 2 of 2). Bulk Cable Specification Chart**

## Specifications for Right-Angle Connectors

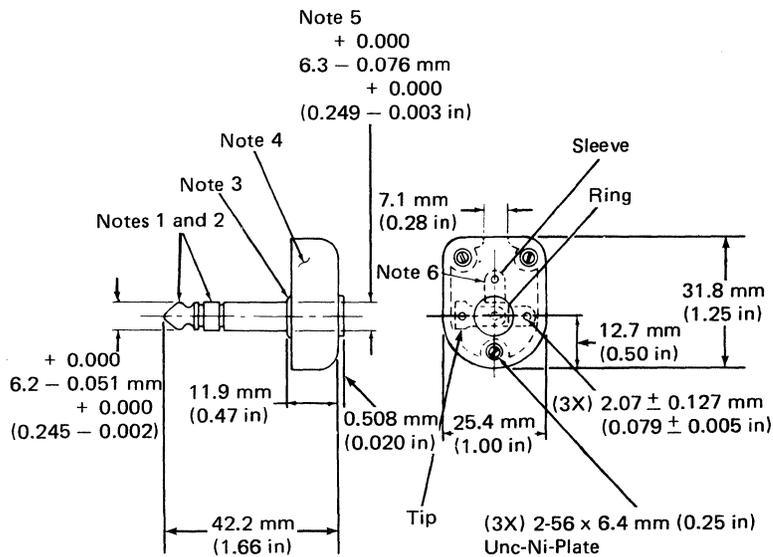
### JACK (IBM PN 5252766)



#### Notes:

1. Jack body adapter and sleeve plating to be 0.00254 mm (0.0001 in) minimum nickel.
2. Plate to be steel-cadmium plated 0.00254 mm (0.0001 in) minimum thick.
3. Handle to be black-plastic.
4. Three terminals to have 1.78 + 0.0127 x 2.77 + 0.127 mm (0.070 + 0.0005 x 0.109 + 0.005 in) slots and hot-tin dipped.
5. Internal tip and ring contacts to be plated 0.00127 mm (0.000050 in) minimum hard gold over 0.00127 mm (0.000050 in) minimum nickel.
6. After 50 insertions, contact surface (tip and ring) must not have any nickel underplate exposed when viewed with a 30X magnifier.
7. Terminals accept a No. 0.8232 sq. mm (No. 18 AWG), maximum.

### PLUG (IBM PN 5252765)

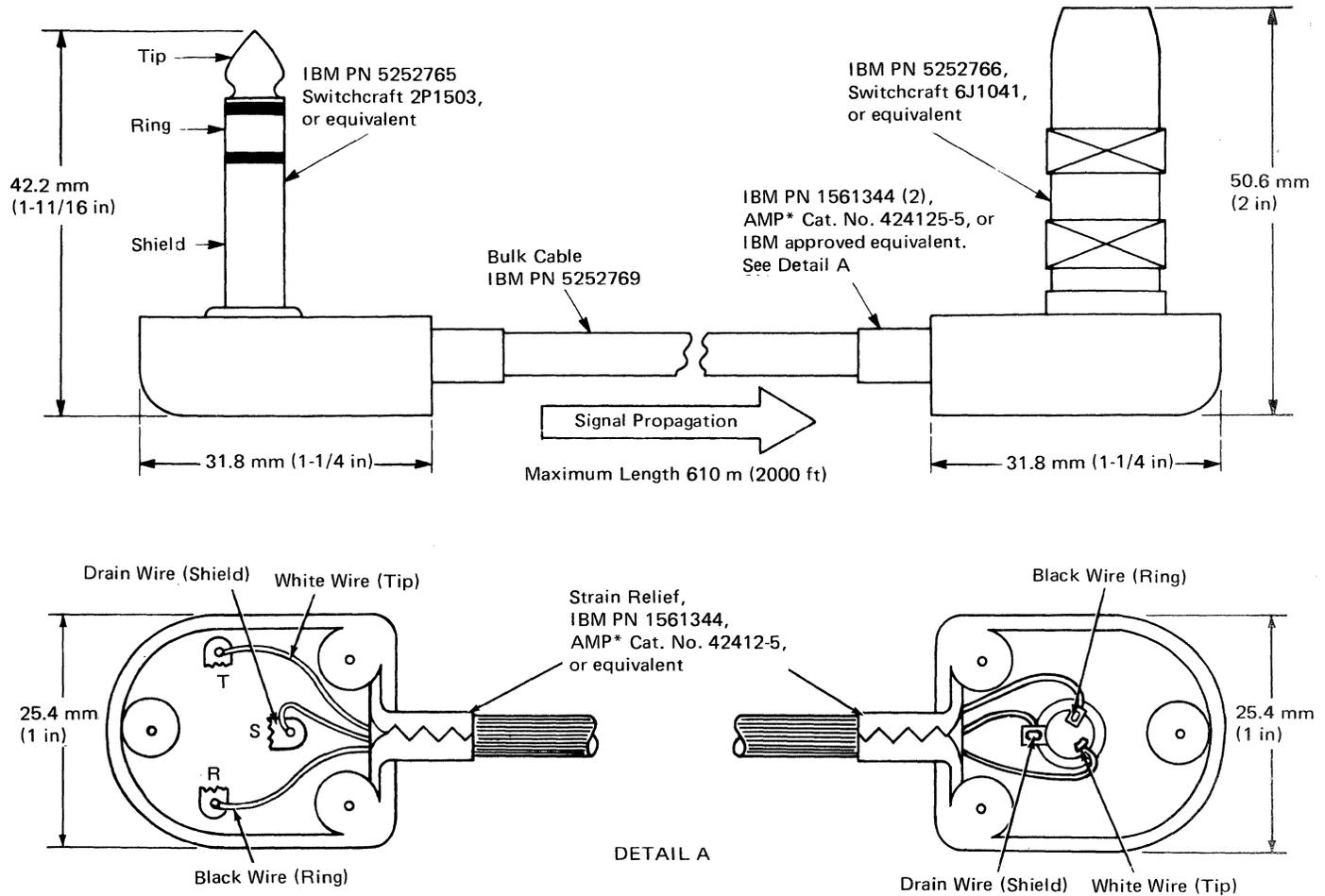


#### Notes:

1. Tip and ring to be plated 0.00127 mm (0.00005 in) hard gold over 0.00127 mm (0.00005 in) minimum nickel.
2. After 50 insertions:
  - (A) Contact surface (tip and ring) must not have any nickel underplate exposed when viewed with a 30X magnifier.
  - (B) Lamination shall show no separation due to weakened peen.
3. Plate to be steel-cadmium plated 0.00254 mm (0.0001 in) minimum thickness.
4. Handle to be black-plastic.
5. Sleeve plating to be 0.00254 mm (0.0001 in) minimum nickel.
6. Three terminals to be brass-hot solder dipped.
7. Contacts not to be used to break current.
8. Terminals accept a No. 0.8232 sq. mm (No. 18 AWG), maximum.

Dimensions are shown in millimeters (and inches).

Figure 5-13 (Part 1 of 2). Right-Angle Terminal Port Specifications



**Figure 5-13 (Part 2 of 2). Right-Angle Terminal Port Specifications**

# Specifications for Wall-Plate Assemblies

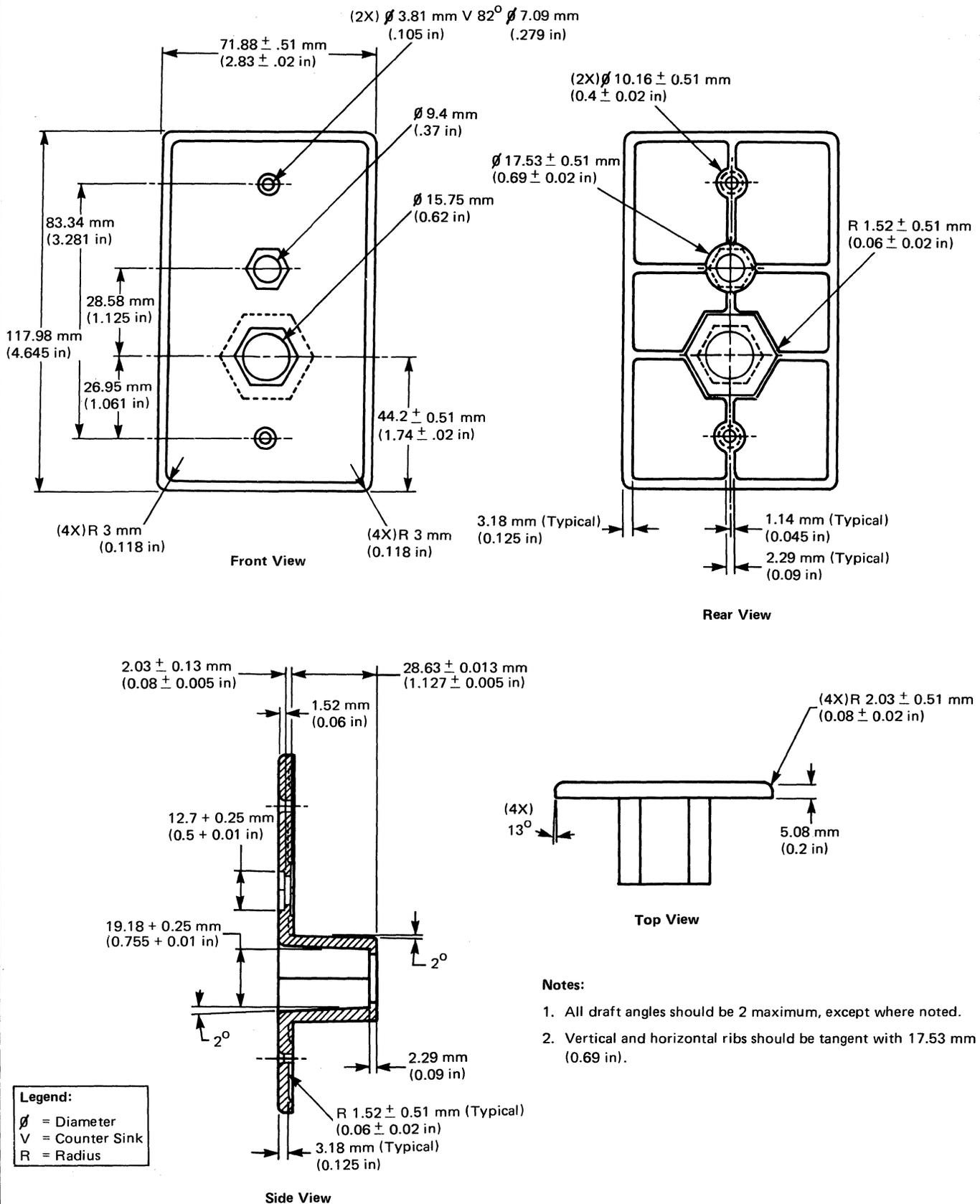
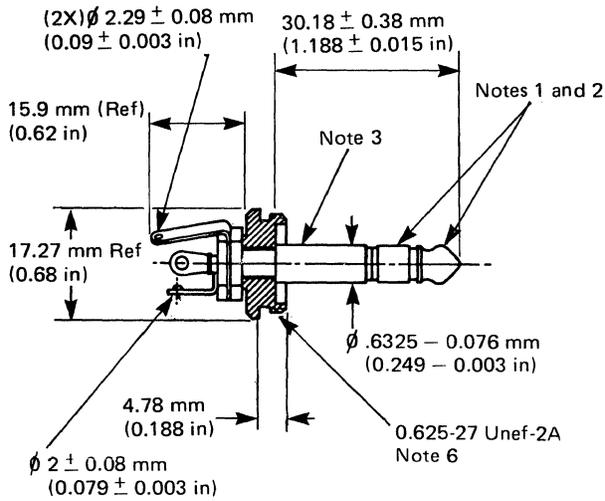
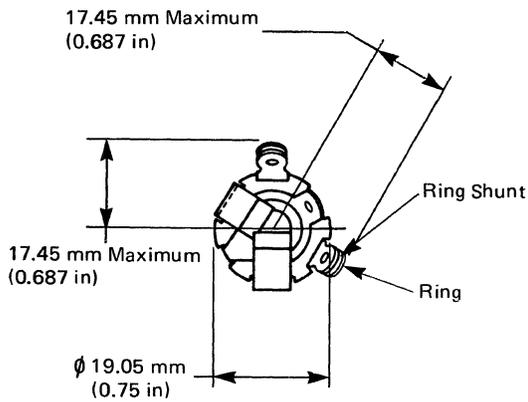


Figure 5-14 (Part 1 of 2). Wall-Plate Terminal Port Specifications



**Notes:**

1. Ring and tip should be plated 0.0013 mm (0.00005 in) hard gold over 0.0013 mm (0.00005 in) nickel.
2. After 50 insertions:
  - Tip and ring (contact surface) must not have any nickel underplate exposed when viewed with a 30X magnifier.
  - Laminations shall show no separations due to weakened peen.
3. Sleeve Plating should be 0.0025 mm (0.0001 in) minimum nickel.
4. Contacts should not be used to break current.
5. Mates with the female jack.
6. Vendor to finish one cadmium plated nut – plating to be 0.005 mm (0.0002 in) minimum thick with clear chromate treatment for mounting on the component.
7. Part need not have UL approved source.



**Notes:**

1. Contact plating 0.003 mm (0.0001 in) minimum hard gold over nickel-silver alloy-based material on tip and ring contacts with nickel-flash on sleeve contact.
2. After 50 insertions tip and ring (contact surface) must not have any nickel underplate exposed when viewed with a 30X magnifier.
3. Contacts should not be used to break current.
4. Vendor to finish one nickel plated locknut and one nickel-plated washer.
5. Mates with the male plug.
6. Part need not have UL approved source.
7. Tip and ring shunt contacts should be gold alloy.
8. Terminals should be hot-tin dipped.

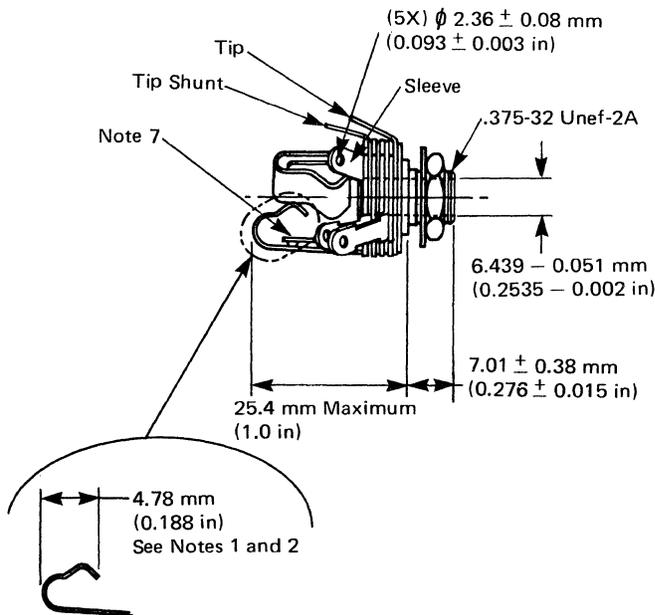


Figure 5-14 (Part 2 of 2). Wall-Plate Terminal Port Specifications

## **| Installing and Checking the Loop**

| This section contains the information and instructions to guide you in installing your loop cables and connectors, then checking them.

### **| Special Considerations and Information**

You must consider the following topics before and during loop cable installations.

#### ***I. National Electrical Code Classification***

The loop circuits of the 4700 system meet the requirements for Class 2 low-voltage wiring, as defined in Article 725 of the National Electrical Code.

All loop cabling for the 4700 system that is supplied by IBM is Underwriters Laboratory listed.

The customer should ensure that all electrical codes pertaining to this type of wiring are met.

#### ***II. Loop Cable Separation Guide***

Loop cable should be separated from electrical wiring for voltages up to 440 volts by the distances given in the following guide. For the separation distances from wires that contain voltages greater than 440 volts, see your marketing representative.

The minimum distance between loop cables and fluorescent, neon, or incandescent light fixtures is:

127 mm (5 in)

The minimum distances between loop cables and unshielded power lines or electrical equipment are:

2 kVA or below	127 mm (5 in)
2 to 5 kVA	305 mm (12 in)
Over 5 kVA	610 mm (24 in)

The minimum distances between loop cables (with loop cable enclosed in a grounded metallic conduit) and unshielded power lines or electrical equipment are:

2 kVA or below	64 mm (2.5 in)
2 to 5 kVA	152 mm (6 in)
Over 5 kVA	305 mm (12 in)

The minimum distances between loop cables and power lines (with power lines enclosed in a grounded metallic conduit) are:

2 kVA or below	64 mm (2.5 in)
2 to 5 kVA	152 mm (6 in)
Over 5 kVA	305 mm (12 in)

The minimum distances between loop cables and power lines (when the loop cable and power lines are enclosed in a grounded metallic conduit) are:

2 kVA or below	31 mm (1.2 in)
2 to 5 kVA	76 mm (3 in)
Over 5 kVA	152 mm (6 in)

Some governing factors that you should know before asking for guidance for voltages greater than 440 volts are:

- Voltage and short-circuit amperage of the power lines and the imbalance of three-phase lines
- Shield, if any, and type of shielding
- Type of power lines (for example, multi-grounded neutral-balanced three phase)
- Length of parallel run.

### ***III. Indoor Cable Runs***

- Provide adequate clearance where cables cross passageways or other locations in which physical damage is possible.
- Do not put cables in areas exposed to excessive heat or moisture.
- Provide protection for the cables that must cross walkways.
- Support cable runs every 3.1 m (10 ft).
- Separate cables from power lines and equipment. See “Loop Cable Separation Guide” in this chapter.

### ***IV. Outdoor Cable Runs***

- Cables on poles should be below the light and power conductors and must not be attached to a cross-arm carrying light or power conductor.
- Cable is not self-supporting and requires a messenger for support.
- You must provide proper lead-in clearances.
- Lead-in or aerial-drop cables from a pole or other support, including the point of initial contact with a building, should be kept away from electrical light or power circuits to avoid the possibility of accidental contact.

## **| Things to Do Before Installing the Loops**

The following topics must be done to ensure that you have an easy and problem-free installation.

### ***I. Making Labels***

After you order the cables, you should make labels. Your cable inventory sheets should have all the information required for making up labels for each site.

*Cable Segment Labels:* The label for each end of a cable segment should identify:

- Loop number
- “From” location (source of data flow)
- “To” location (destination of data flow)

*Loop Terminal Port and Work-Station Labels:* Prepare labels that identify the loop terminal ports at each work station. These identification numbers should be available from the site floor plan or cable inventory sheets. These labels should identify the loop and loop-adapter numbers and any other identification numbers that have been assigned to a work station.

It is important to identify each loop-terminal port before you begin to install cable. It will be helpful to the people installing the cable and can be used after the system is installed for identifying a loop-terminal-port location if a terminal device has a problem.

### ***II. When Cables Arrive***

- If you are using any preassembled cable, use your cable inventory sheet to sort the cable segments and place labels on both ends. The labels will make it easier to identify cables during installation and to identify cables that may have problems after you have installed them.
- Label the bulk cable after each segment is installed.
- Perform the steps in the following figure (Figure 5-15) to identify the checks that you must do before installing connectors or loop cables.

The following diagram identifies the procedure(s) you need to perform to ensure that your cables and accessories (just received) are good. **By performing the necessary preinstallation checks, you lower the possibility of having loop problems after you install your loop cables and connectors.**

Each procedure identified in the diagram is located in **Appendix G, "Loop Checks (Before Installation)."** List all the procedures that you must perform before continuing.

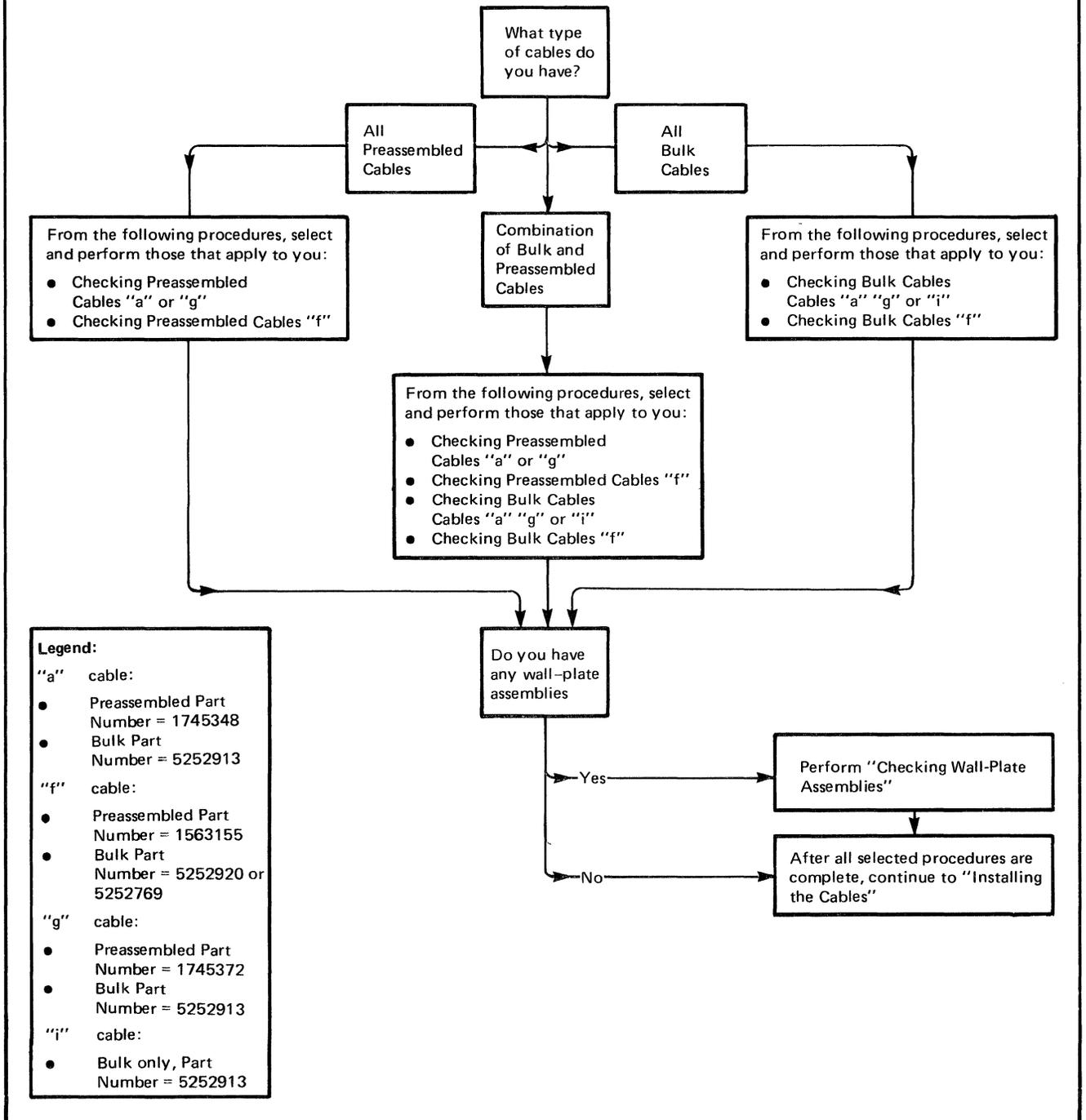
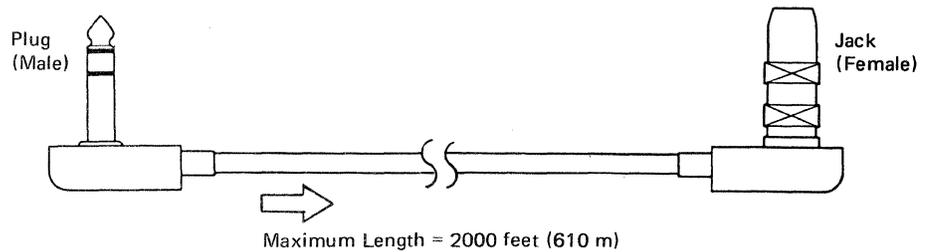


Figure 5-15. Preinstallation Checks Diagram

**Note:** Ensure that you have performed all preinstallation checks before installing the loop.

- Use your site floor plan as the blueprint for installing your loop. It identifies your loop routes (both local and remote) and the loop terminal ports.
- You should also use your cable inventory sheet and loop layout form as sources of information when installing your loop. These forms provide "To" and "From" information, cable descriptions, and building references.
- Loop installation should begin at the controller. The cables that connect to the controller loop adapter ports *must* always be two-conductor cables with right-angle male plugs (IBM part number 5252765) and right-angle female jacks (IBM part number 5252766).



The first loop terminal port and each succeeding terminal port can use right-angle or wall-plate assembly connectors. Of course, all of this information is detailed on your floor plan, cable inventory sheet, and loop layout form.

All the following topics help you assemble your loop terminal ports. After the loop is installed, ensure that the loop is thoroughly checked, refer to "Checking the Loops" on page 5-42 in this chapter.

### ***I. Right-Angle Connectors***

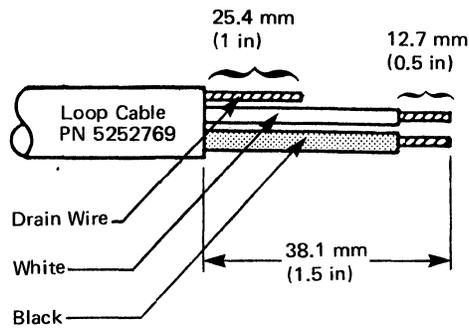
If you are using bulk cable and attaching right-angle connectors to each segment of cable, you will require the following connector parts or their equivalent to complete the assembly of each segment:

- Part number 5252766 right-angle connector (jack)
- Part number 5252765 right-angle connector (plug)
- Part number 1561344 strain reliefs (2)

Figure 5-13 provides the diagram and specifications for assembling right-angle connectors. IBM recommends that you use two-conductor loop cable (part number 5252769, cable key = f) with the right-angle connectors.

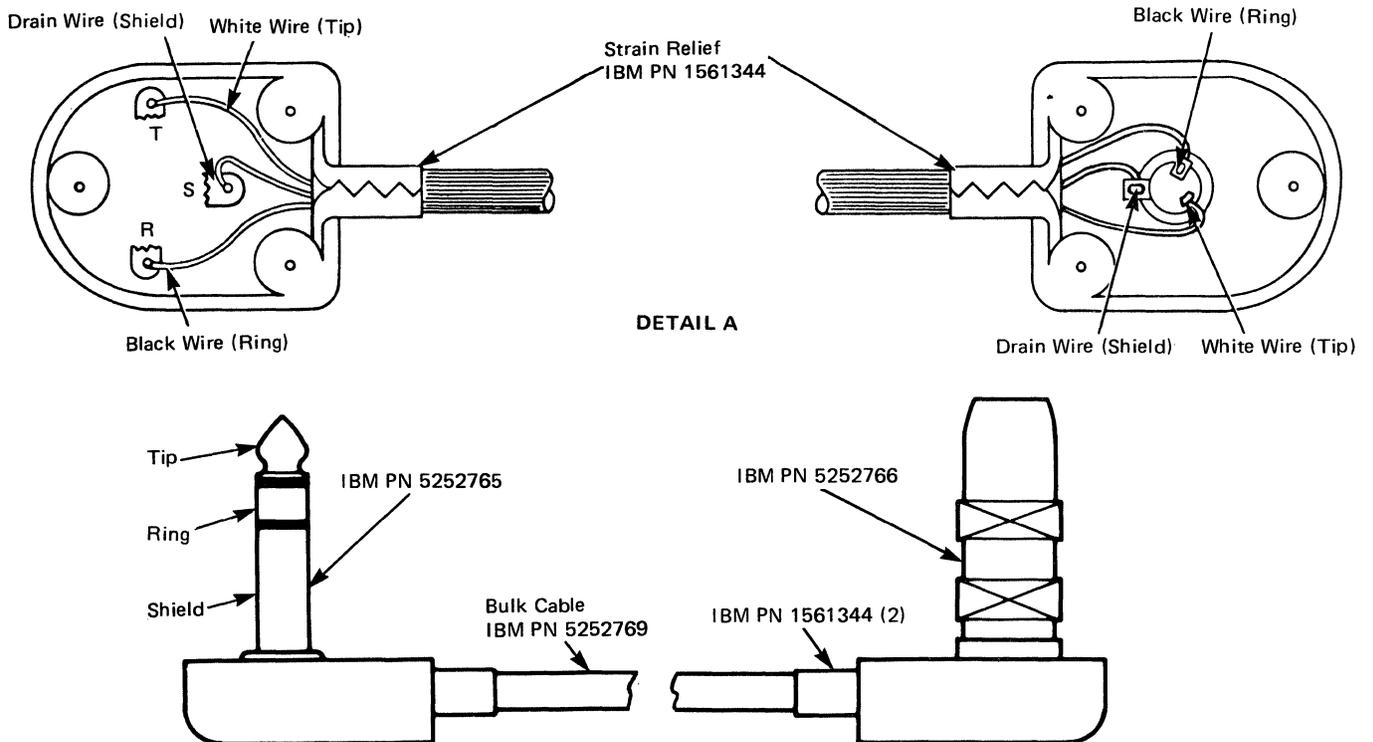
**Note:** Right-angle connectors and their strain reliefs do not attach securely to four-conductor cable (part number 5252913, cable key = i), so you should avoid using right-angle connectors with four-conductor cable.

*Cable End Dressing:*



*Instructions:*

1. Use good commercial soldering practice when soldering connections.
2. To terminate both ends of the cable as shown in *Detail A*, perform the following:
  - a. Use AMP\* crimp tool (AMP Cat. No. 69474-3) to crimp the strain relief over the cable jacket (flush with the jacket end as shown).
  - b. Solder the drain wire to the shield "S" contact, the white wire to tip "T" contact, and the black wire to ring "R" contact.
  - c. Assemble the housing with the ears of the strain relief as shown in *Detail A*.



**Figure 5-16. Assembling Right-Angle Connectors on Loop Cable**

## ***II. Wall-Plate Connector Assembly***

If you are running bulk cable and using the wall-plate terminal ports you require the following parts or their equivalent at each port:

- Wall-Plate Assembly (part number 5929886)
- Electrical Terminal Box (see Figure 5-18)
- Strain Relief Clamp.

The wall-plate assembly connector can be used with either a two- or four-conductor loop cable. When a four-conductor cable is being attached to a wall-plate assembly, take care to prevent the two shields from making electrical contact, especially at the points where the shields are trimmed off. Figure 5-17 , Figure 5-18, and Figure 5-19 show how to wire and mount a wall-plate assembly.

**Note:** Take care when working with four-conductor cable to ensure that each shielded pair is insulated from the other when making any connections or installing any connectors. This is accomplished in this cable by the Mylar<sup>2</sup> tape on the outside of the aluminum/Mylar tape shield (see Figure 5-12).

---

<sup>2</sup> Trademark of E.I. DuPont de Nemours Co., Inc.

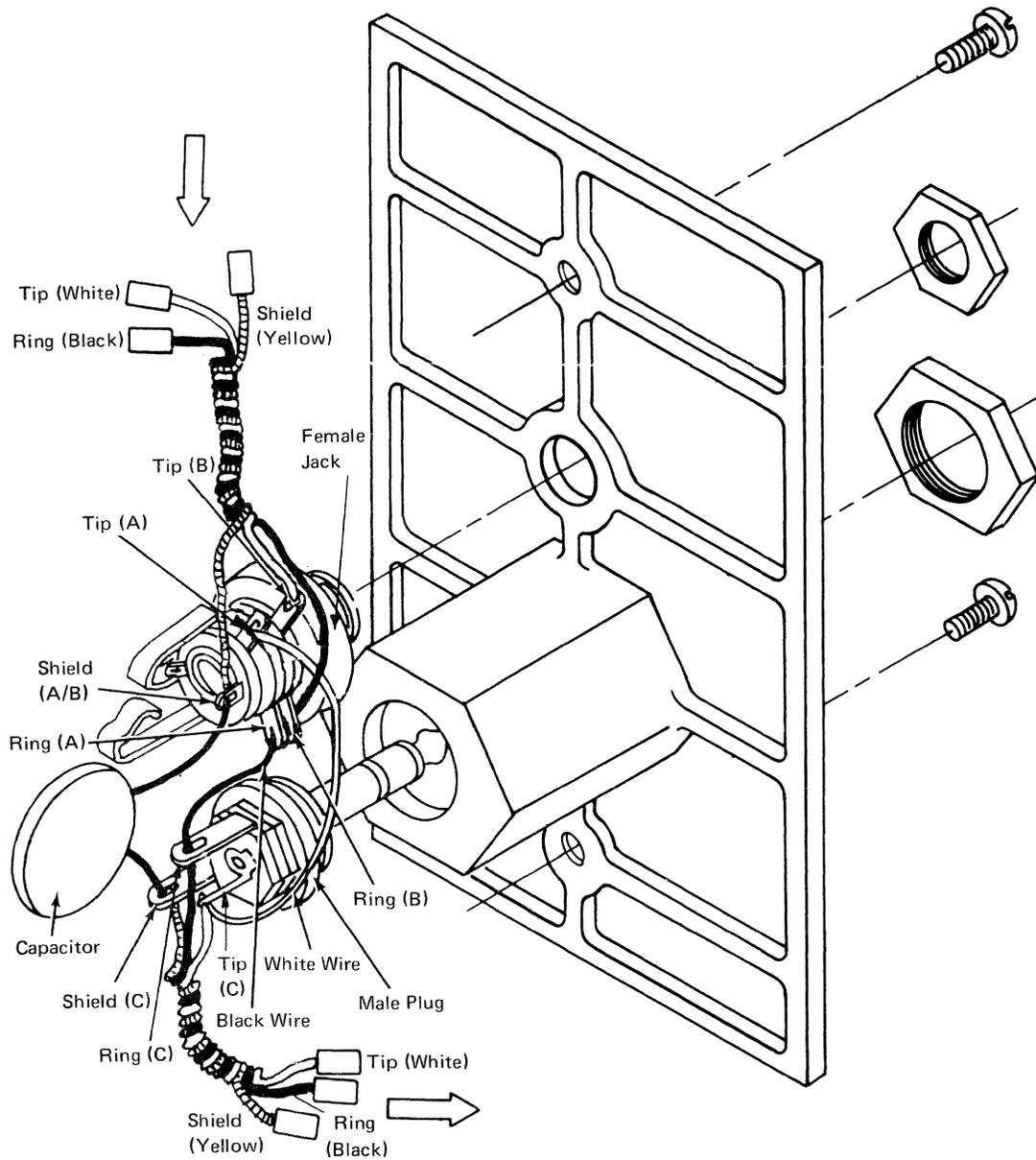
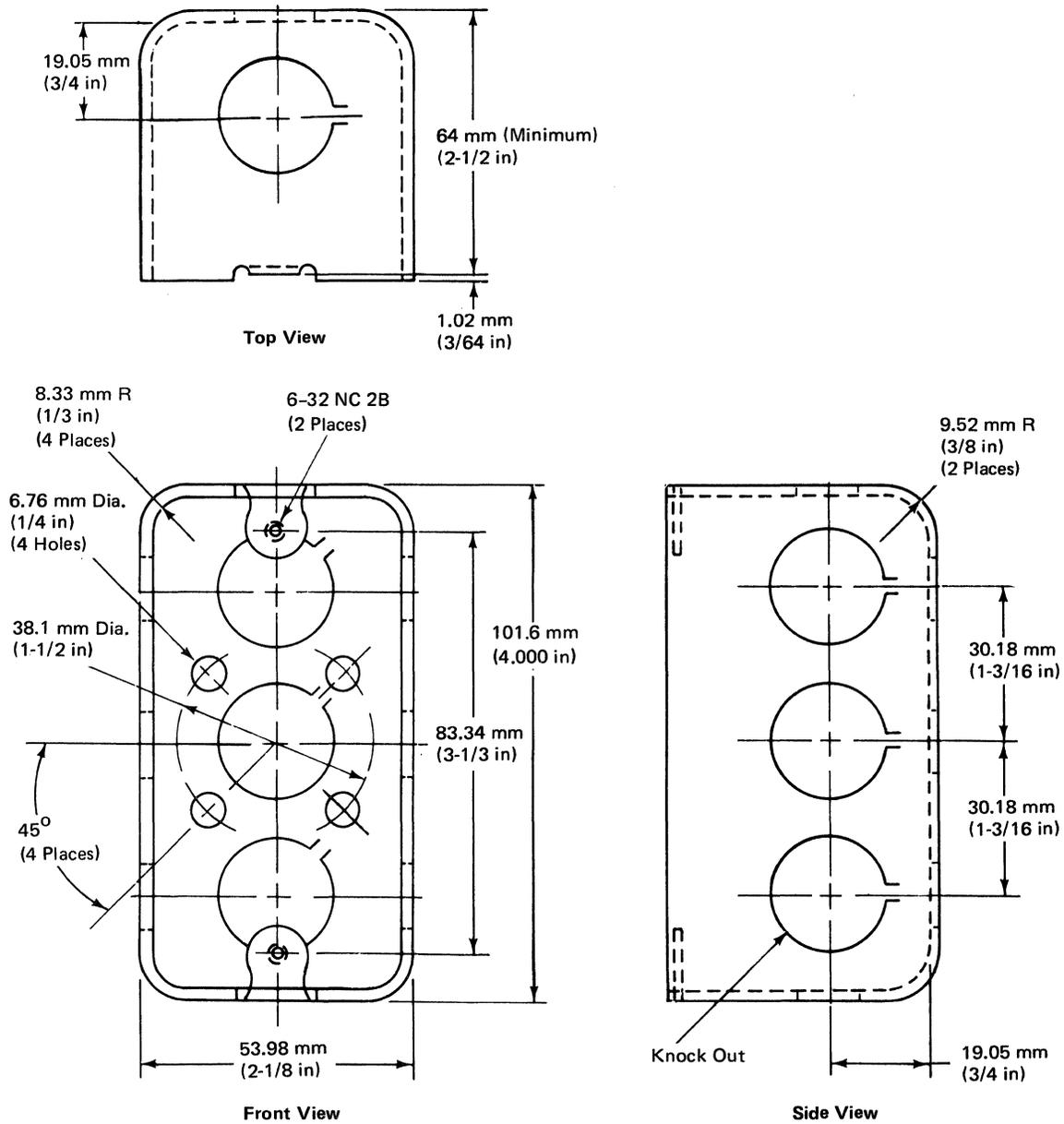


Figure 5-17. Wall-Plate Assembly (part number 5929886) Wiring

**Note:** If the depth of your electrical terminal box does not meet the 64-mm (2.5-in) minimum -- shown in the "Top View"-- you could damage the wall-plate assembly when you install it.



**Figure 5-18. Typical Electrical Terminal Box for a Wall-Plate Assembly**

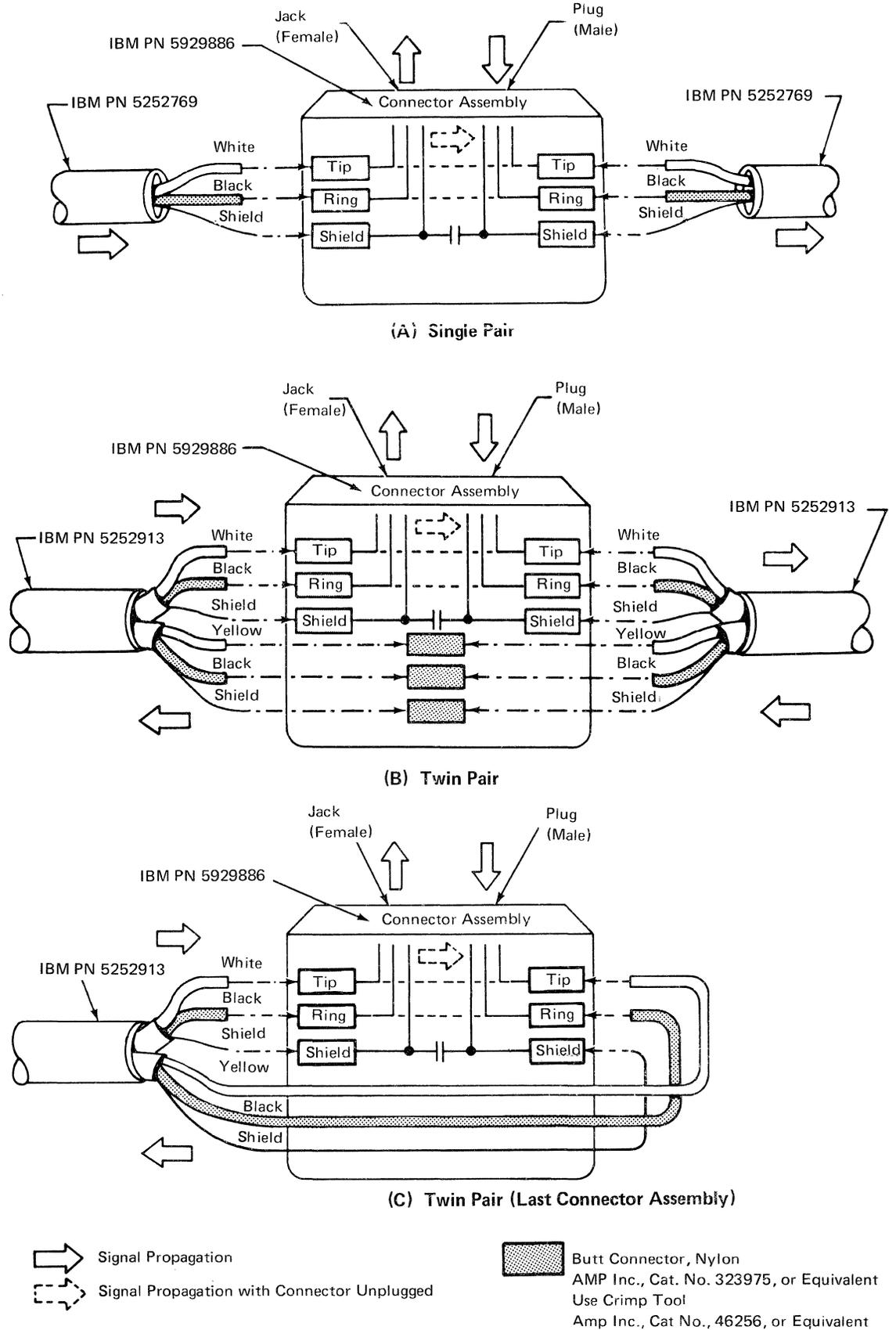


Figure 5-19. Wall-Plate Assembly Using Single and Double Twin-Pair Cable

After you have installed your loop, you must ensure it was installed correctly. To identify the procedure(s) you must perform, refer to Appendix G, “Loop Checks (After Installation).”

### **Loop Lightning Protection**

To help protect personnel and equipment from lightning energy surges, you must attach lightning protectors to each end of all loop cables that are routed outside. This is recommended for both overhead and buried cable runs. IBM offers an RPQ to provide this protection, but lightning protection is also available from vendors.

To obtain the RPQ, order MES Bill of Material number 4405010. Allow sufficient time for delivery and installation (installation instructions are provided with the bill of material).

Station protectors are also needed with this RPQ. The customer is responsible for providing these protectors. You can order these protectors from IBM or a vendor of your choice. To order the protectors from IBM, order part number 1830818. This part number contains a kit for gas element station protectors, which includes:

- **Part Number 5252895** -- Two station protectors (Reliable Electric Company part number R123-FSR or equivalent).
- **Part Number 5252899** -- a gas protector unit (Reliable Electric Company part number 1304-FSR or equivalent). This unit is a replaceable item for the gas element station protector.

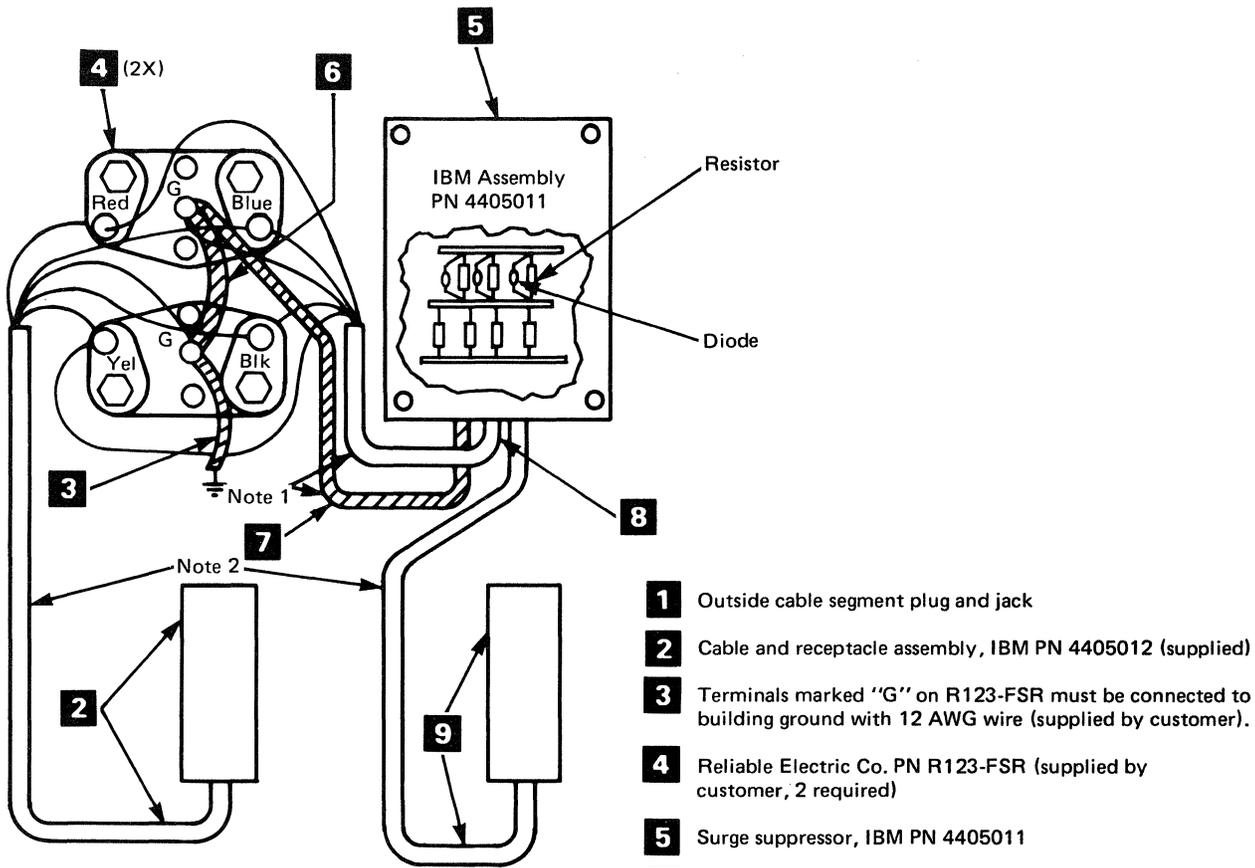
The protector is designed for inside installation and should be installed at the point at which the cable enters or exits from the building and as close to suitable ground as practical. The protector must be grounded. The minimum recommended gauge of the grounding conductor is 12 AWG [2.1-mm (0.08-in) diameter]. The grounding conductor must be routed to the grounding electrode in as straight a line as practical and should not exceed 3.1 m (10 ft). If the 3.1-m (10-ft) length of the grounding conductor must be exceeded, use a larger-diameter conductor. The following are the various types of grounding electrodes in the preferred sequence:

1. Public metallic water pipe system (any metallic water pipe system will suffice, if at least 3.1 m (10 ft) is in moist earth).
2. Power-service conduit, service equipment enclosure, or building steel. (Usually when a metallic water-pipe system is not available, the grounding system used by the power utility is the best available ground).
3. Other grounding electrodes approved by local/national codes; for example, National Electric Code 800-31.
4. The grounding rod electrode, the least preferable because rods driven in other than good, moist earth (in water table) have been known to have a resistance of several hundred ohms.

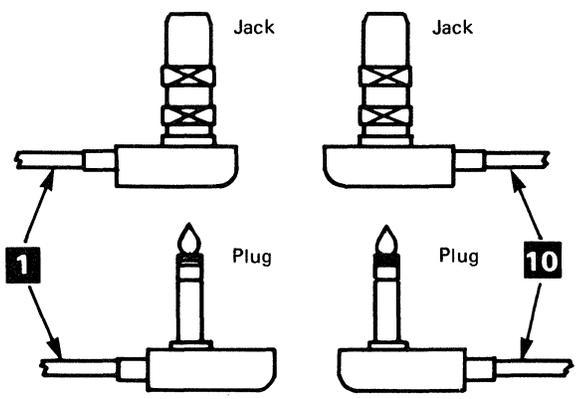
All grounds should be common (National Fire Protection Code). Common grounding is recognized as the most effective method of preventing side flashes

from a lightning discharge. The conductors used for bonding and interconnecting these grounds must be at least number 6 AWG [4.1-mm (0.15-in)] copper wire (lightning protection code NFPA-78).

Lightning protectors should not be installed in areas where unauthorized personnel might come in contact with them. Lightning protectors and the cable that runs from the protector to the terminal should not be installed, maintenance performed, connected or disconnected, or handled in any way during periods of lightning activity. The protectors should be installed so that access for maintenance and replacement of the elements can be readily accomplished. The area of the building at which the cables enter and leave must neither contain combustible material nor be considered a hazardous area. Figure 5-20 is a detailed view of the Loop Lightning Protection RPQ.



- 1** Outside cable segment plug and jack
- 2** Cable and receptacle assembly, IBM PN 4405012 (supplied)
- 3** Terminals marked "G" on R123-FSR must be connected to building ground with 12 AWG wire (supplied by customer).
- 4** Reliable Electric Co. PN R123-FSR (supplied by customer, 2 required)
- 5** Surge suppressor, IBM PN 4405011
- 6** 101.6 mm (4.00 in) green/yellow jumper wire, IBM PN 5758756 (supplied)
- 7** Green/yellow ground wire (attached to IBM PN 4405011)
- 8** Cable (attached to IBM PN 4405011)
- 9** Cable and receptacle assembly (furnished with IBM PN 4405011)
- 10** Inside cable segment plug and jack



Notes:  
 1. Cable length is 0.6 m (2 ft).  
 2. Cable length is 1.8 m (6 ft).

Figure 5-20. Detailed View of Loop Lightning Protection RPQ

## | Device Communications Adapter (DCA) Cables

Some of the devices that attach to the 4700 system use DCA attachment. This section provides DCA ordering information, such as:

- Types of cables available
- IBM part numbers for customers who choose to purchase preassembled cables from IBM
- Specifications for cables and connectors for customers who choose to assemble their cables.

For installing information and other DCA cable details not covered in this manual, refer to *Installation and Assembly of Coaxial Cable and Accessories*, GA27-2805.

Before you begin, you should have a floor plan and cable inventory sheet. The floor plan helps you in determining cable lengths and routing. The cable inventory sheet (see Appendix A, Figure A-3 and Figure A-4) helps clarify each site's cabling needs and helps you in ordering, labeling, and verifying delivery of cables. Use one cable inventory sheet for each controller.

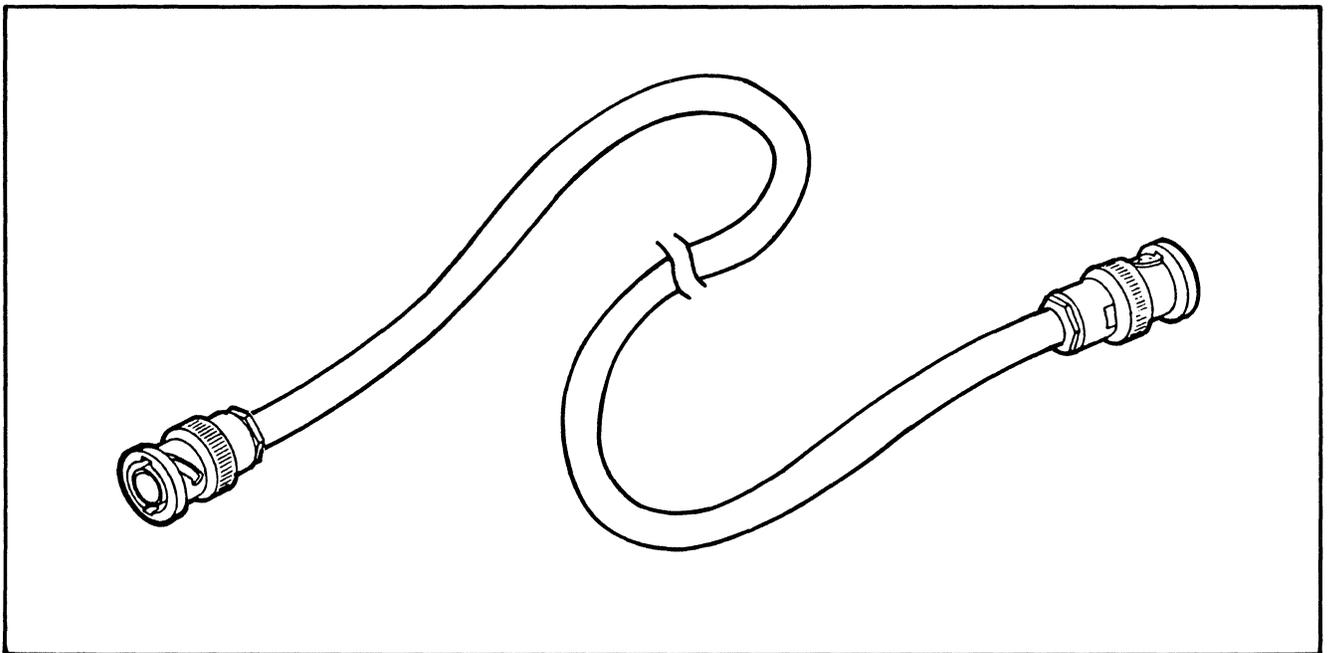


Figure 5-21. DCA Coaxial Cable

## | Ordering Coaxial Cable

You can order coaxial cables from IBM or any source that you choose. IBM coaxial cables are either preassembled (cut to specified lengths with connectors installed) or nonassembled (bulk cable and IBM-approved connectors that you assemble with the cables).

## | Coaxial Cable Types

Three types of coaxial cable are available from IBM. The type that you must use depends on where and how it will be installed: indoor, indoor plenum, or outdoor. (A plenum is an air-handling space for heating/cooling. Consult your local code.) If you plan to use non-IBM cables, they must meet both physical and electrical specifications of Figure 5-23 on page 5-48.

**Note:** Not all cables labeled RG62A/U meet the specifications of Figure 5-23. Using cables that do not meet these specifications can cause system malfunctions.

Coaxial cables between 4701 controller and each DCA terminal must not be longer than 1500 m (4920 ft).

**Indoor:** This cable is designed for indoor installation not inside a plenum.

**Indoor Plenum:** This cable is approved only for indoor installation inside a plenum.

**Outdoor:** This cable is approved for both indoor and outdoor installation. As an outdoor installation, you can have it installed overhead on poles or buried underground.

## | Preassembled Cable IBM Part Numbers

If you are ordering preassembled cables from IBM, specify the length and one of the following part numbers for each cable.

Cable Type	IBM Part Number	Maximum Length
Indoor	2577672	1500 m (4920 ft)
Indoor plenum	1743645	1500 m (4920 ft)
Outdoor	1833108	1500 m (4920 ft)

## | Nonassembled Cable Specifications

If you choose to assemble your cables, use the following specifications and descriptions to select the correct bulk cable type and IBM-approved connectors.

You can order bulk cable and connectors from IBM or any source that you choose. Refer to Figure 5-23 on page 5-48 and order enough bulk cable for your cable runs. Also, order either of the following:

- Two IBM or equivalent connectors for each cable, or
- One IBM connector kit (includes two connectors) for each cable.

Figure 5-22 shows the IBM part numbers for connectors and kits.

Cable Type	IBM Part Number Connector	IBM Part Number IBM Connector Kit
Indoor	1836444	1836418
Indoor plenum	4449035	1743508
Outdoor	1836447	1836419

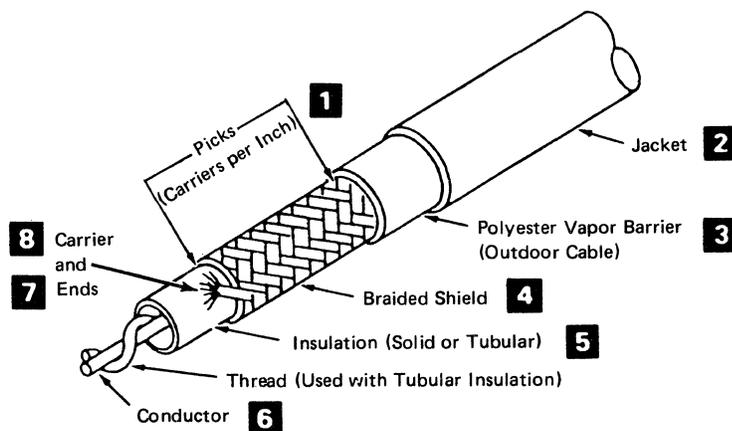
Figure 5-22. IBM Part Numbers of Connectors and Connector Kits

**Note:** Instructions for assembling connectors on bulk cable are given in *Installation and Assembly of Coaxial Cable and Accessories for Attachment to IBM Products, GA27-2805*.

IBM Part Number		323921	5252750	4885584
Cable Type (Notes 1, 2)		Indoor	Outdoor	Plenum
Jacket <b>2</b>	Material Wall thickness Outside diameter	PVC 0.79 mm (0.031 in) 6.15 mm (0.242 in)	PVC 1.02 mm (0.040 in) 6.6 mm (0.260 in)	Teflon (Note 4) 0.51 mm (0.020 in) 5.71 mm (0.225 in)
Physical	Polyester vapor barrier <b>3</b> Temperature rating Voltage rating Type	No 60°C (140°F) 2 30 V Solid	Yes	No 105°C (221°F) 150 v 150 V
Center Conductor <b>6</b>	Wire size Material Conductivity Dc resistance (max)	0.325 mm <sup>2</sup> - 22 AWG Copper-Covered Steel 40% 44 ohms/304.8 m (1000 ft)		
Shield <b>4</b>	Material Wire size Coverage (min) Ends <b>7</b> Carriers <b>8</b> Picks <b>1</b> Dc resistance (max)	Copper 0.020 mm <sup>2</sup> - 34 AWG 90% 7 16 8.2 + 10%/25.4 mm (1 in) 3.0 ohms/304.8 m (1000 ft)		
Electrical	Capacitance (max) Impedance Attenuation (max) Velocity or propagation (min)	14.5 pF/304.8 mm (1 ft) 93 ± 5 ohms 8.0 db/30.5 mm (100 ft) 80%		
UL	Style number	1478	Note	Note 3
Insulation <b>5</b>		Polyethylene		Teflon (Note 4)

**Notes:**

1. Jacket of outdoor cable must meet minimum requirements for underground feeder and branch circuit cable and must be weatherproof; sunlight-resistant per UL Subject 493.
2. Commercial cable designated RG62A/U or M17/030/RG062, meeting the requirements of the above specification, is a suitable substitute. Only cables made in strict conformance with MIL-C-17 requirements may be imprinted with the 'RG' legend. Commercial versions of this cable either omit the *RG* legend or add the word *Type* to the marking and may not be a suitable substitute for RG62A/U cable.
3. Classified by UL as to fire and smoke characteristics.
4. Trademark of E.I. DuPont de Nemours Co., Inc.



**Figure 5-23. Bulk Coaxial Cable Specifications**

# Chapter 6. Machine Specifications

This chapter contains the machine specifications for each of the 4700 system devices. All dimensions are in metric units followed in parentheses by the English units. Unless otherwise stated, the dimensions are in millimeters (and inches).

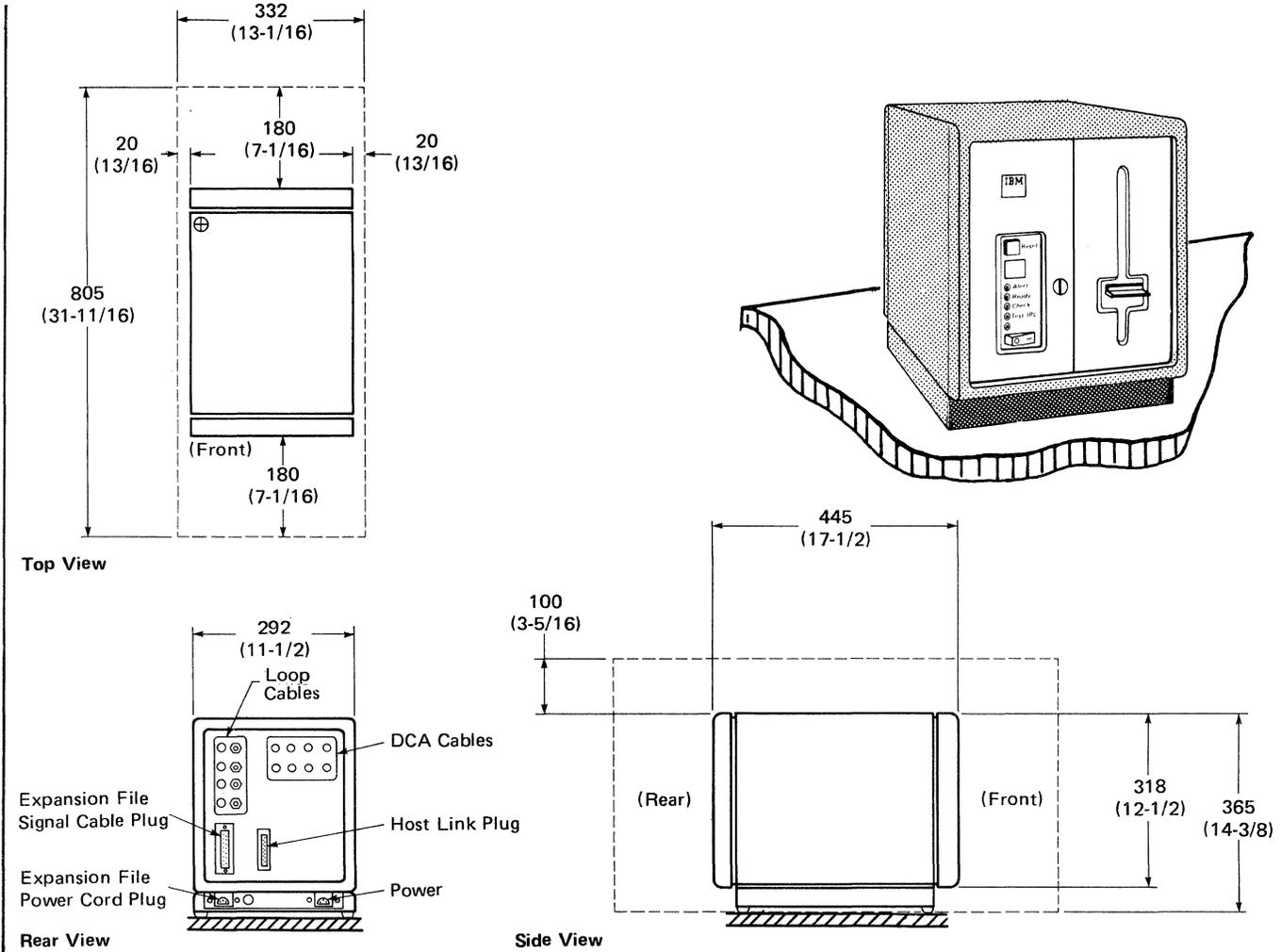
Symbols that appear in specification drawings are defined below:

Symbol	Meaning
-----	Required clearance
⊕	Signal Cable entry/exit
⊠	Power Cable

# 4701 Controller

Plan View (Scale 10 mm = 0.125 m)

Measurements are shown in millimeters (and inches).



## 4701 CONTROLLER

### Specifications

#### *Dimensions:*

	Front	Side	Height
mm	292	445	365
(inches)	(11-1/2)	(17-1/2)	(14-3/8)

#### *Clearances:*

	Front	Rear	Left	Right	Top	Bottom
mm	180	180	20	20	100	
(inches)	(7-1/16)	(7-1/16)	(13/16)	(13/16)	(3-15/16)	**

\*\* The controller *must* be placed on a hard, smooth surface.

**Weight:** 25.4 kg (56 lb)

**Heat Output:** 170 Watts (580 BTU/hr)

**Airflow:** Forced Air Fan — 2.97 m<sup>3</sup>/min (105 cfm)

#### **Power Requirements:**

Volts (60 Hz): 100, 110, 120

Volts (50 Hz): 100, 110, 200, 220, 230, 240

kVA: 0.4

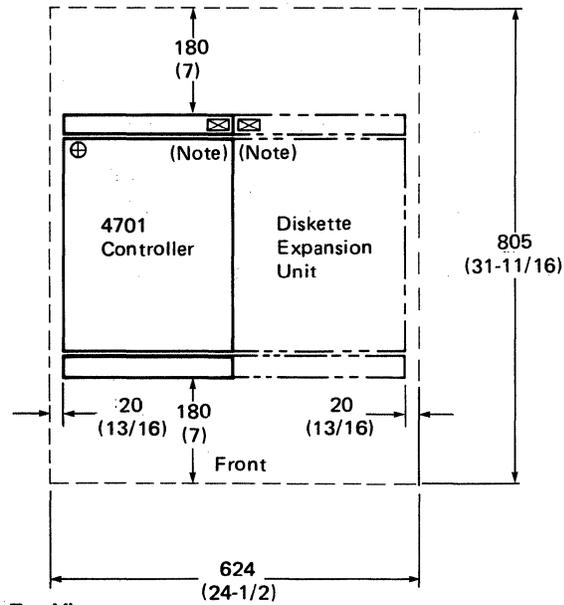
**Power Cords and Plugs:** See Appendix C and Appendix D.

## Diskette Expansion Unit (Feature)

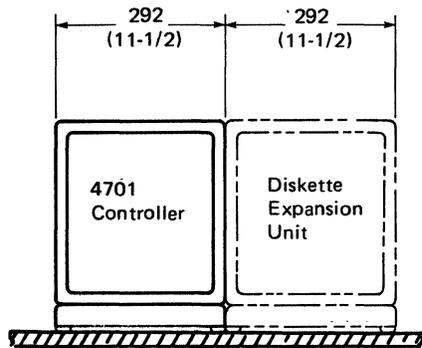
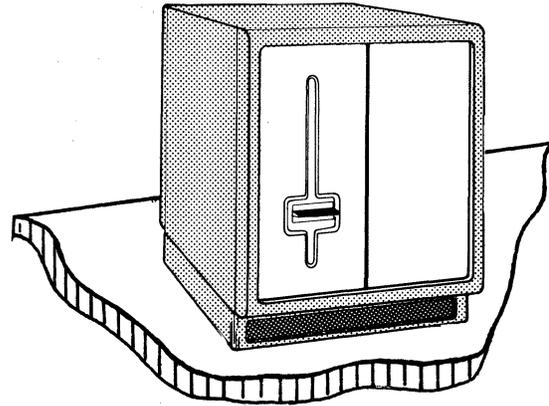
**Note:** The diskette expansion unit contains a diskette file and is used only with the 4701 controllers.

**Plan View (Scale 10 mm = 0.125 m)**

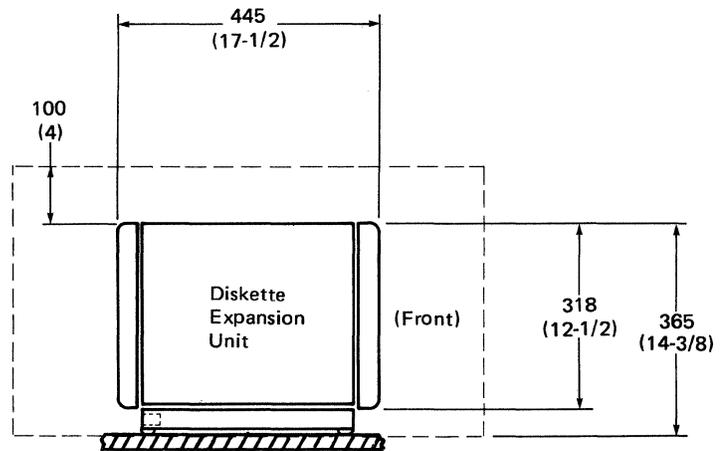
Measurements are shown in millimeters (and inches).



**Top View**



**Front View**



**Side View**

**Note:** The Optional File is connected to controller at these points with two cables (Power/Signal) which are supplied with the feature. Frames cannot be separated by more than about 75 mm (3 in).

**DISKETTE EXPANSION UNIT (Feature)**

**Specifications**

**Dimensions:**

	<b>Front</b>	<b>Side</b>	<b>Height</b>
mm	292	445	365
(inches)	(11-1/2)	(17-1/2)	(14-3/8)

**Clearances:**

	<b>Front</b>	<b>Rear</b>	<b>Left</b>	<b>Right</b>	<b>Top</b>	<b>Bottom</b>
mm	180	180	—	20	100	
(inches)	(7)	(7)	—	(13/16)	(4)	**

\*\* The diskette expansion unit *must* be placed on a hard, smooth surface.

**Weight:** 11.3 kg (25 lb)

**Heat Output:** 60 Watts (204 BTU/hr.)

**Airflow:** Forced Air Fan — 2.97 m<sup>3</sup>/min (105 cfm)

**Power Requirements: \***

**Volts (60 Hz):** 100, 110, 120

**Volts (50 Hz):** 100, 110, 200, 220, 230, 240

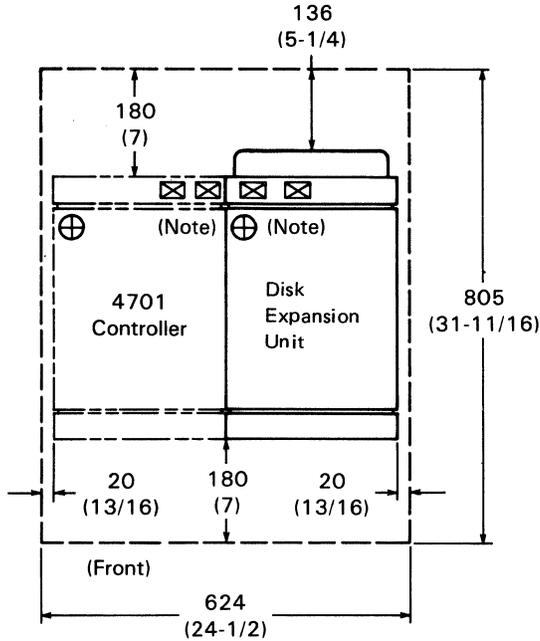
\*Power is obtained from 4701.

## | Disk Expansion Unit (Feature)

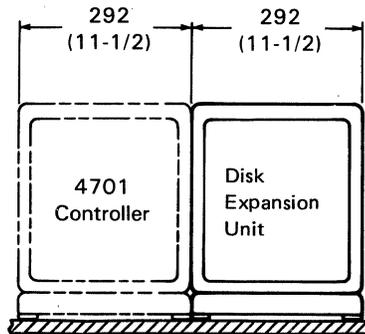
**Note:** The disk expansion unit is used only with the 4701 Model 2 Controllers.

### PLAN VIEW (Scale 10 mm = 0.125 m)

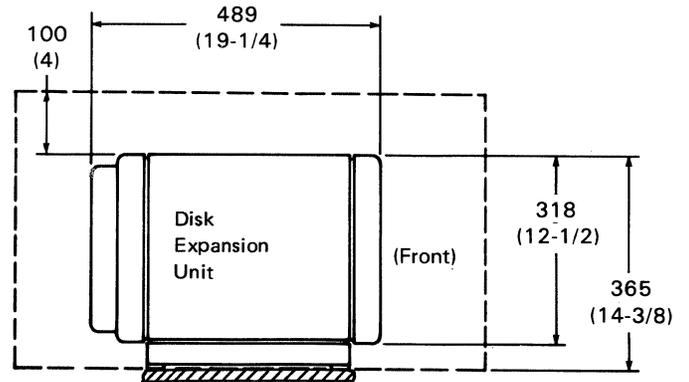
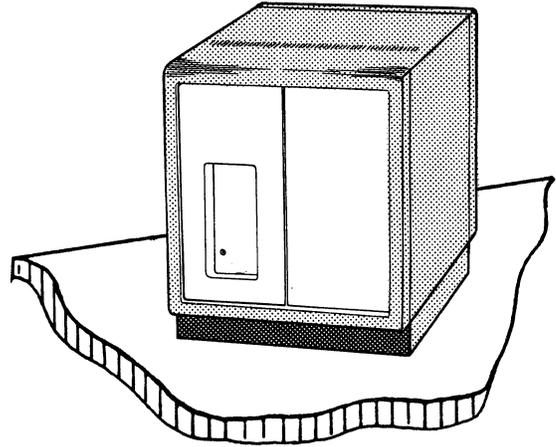
Measurements are shown in millimeters (and inches).



Top View



Front View



Left Side View

**Note:** The diskette and disk drives attach to the controller by cables at these points on the rear panels. Cables are supplied with this feature. The controller and the disk expansion unit must be placed side by side with no clearance between them.

**Warning:** The disk expansion unit must operate only on a level surface.

## DISK EXPANSION UNIT

### Specifications

#### *Dimensions:*

	<b>Front</b>	<b>Side</b>	<b>Height</b>
mm	292	489	365
(inches)	(11-1/2)	(19-1/4)	(14-3/8)

#### *Clearances:*

	<b>Front</b>	<b>Rear</b>	<b>Left</b>	<b>Right</b>	<b>Top</b>
mm	180	180	--	20	100
(inches)	(7)	(7)	--	(13/16)	(4)

\*\*

\*\* The disk expansion unit *Must* be placed on a hard, smooth surface.

**Weight:** Under 31.5 kg (70 lb)

**Heat Output:** 160 Watts (546 BTU/hr)

**Airflow:** Forced air fan -- 2.97 cubic m/min (105 cfm)

#### **Power Requirements:**

**Volts (60 Hz):** 100, 110, 120

**Volts (50 Hz):** 100, 110, 200, 220, 230, 240

**kVA:** 0.25

**Power Cords and Plugs:** See Appendix C and Appendix D.

**Temperature and Humidity:** See "Product Environment" on page 3-16.

## | 4704 Display Stations and Devices

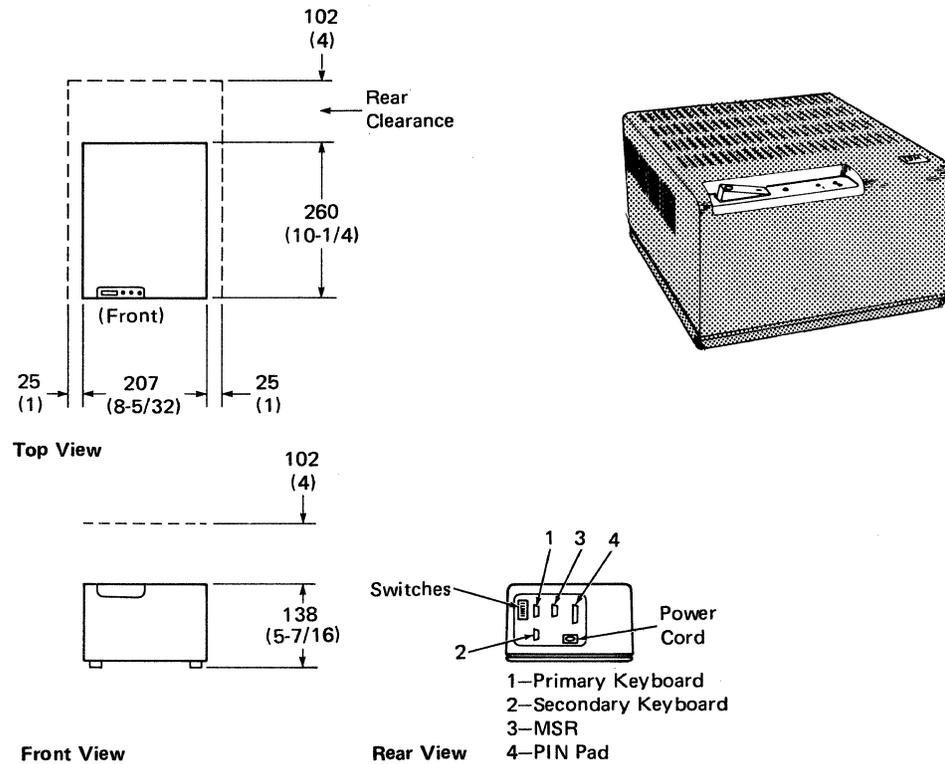
There are three models of the 4704 display stations. The basic configuration for the 4704 Display Station Model 1 is a control module and choices between two display monitors and four keyboards. The basic configuration for the 4704 Display Station Models 2 and 3 is a display module and choices among four keyboards.

### | 4704-1 Display Station Control Module

Plan View (Scale 10 mm = 0.125 m)

Measurements are shown in millimeters (and inches).

**Note:** Control Module must be upright. Do not mount on wall.



## 4704-1 DISPLAY STATION CONTROL MODULE

### Specifications

#### *Dimensions:*

	<b>Front</b>	<b>Side</b>	<b>Height</b>
mm	207	260	138
(inches)	(8-5/32)	(10-1/4)	(5-7/16)

#### *Clearances:*

	<b>Front</b>	<b>Rear</b>	<b>Left</b>	<b>Right</b>	<b>Top</b>
mm	(Operator	102	25	25	102
(inches)	Access)	(4)	(1)	(1)	(4)

**Weight:** 3.6 kg (8 lb)

**Heat Output:** 60 Watts (204 BTU/hr.)

**Note:** The figures for heat output shown here are for basic configuration (consisting of a display monitor and keyboard). Add 4 watts for a magnetic stripe unit; keyboard heat output is negligible.

**Airflow:** Natural Convection

#### **Power Requirements**

**Volts (60 Hz):** 100, 110, 120

**Volts (50 Hz):** 100, 110, 200, 220, 230, 240

**KVA:** 0.15

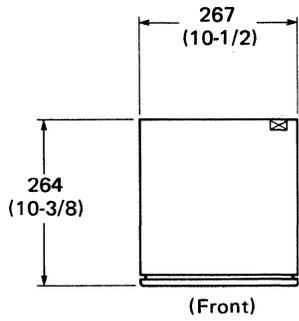
**Power Cords and Plugs:** See Appendix C and Appendix D.

**Cable Length:** Loop Attachment = 2.1 m (82 in)

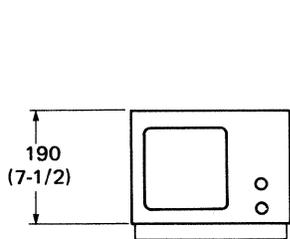
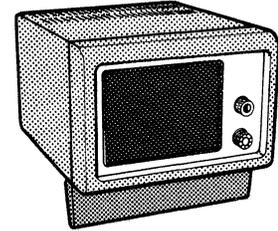
# | 4704-1 Display Station Display Monitor (Large Screen)

Plan View (Scale 10 mm = 0.125 m)

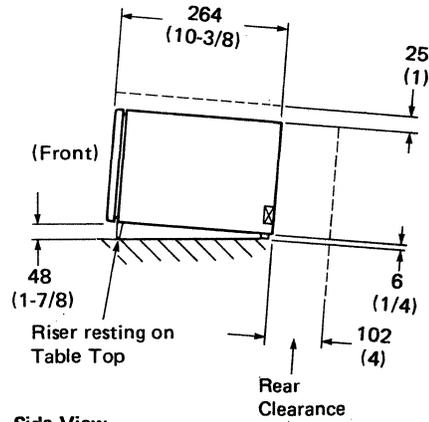
Measurements are shown in millimeters (and inches).



Top View



Front View



Side View

## 4704-1 DISPLAY STATION DISPLAY MONITOR (Large Screen)

### Specifications

#### *Dimensions:*

	<b>Front</b>	<b>Side</b>	<b>Height</b>
mm	267	264	190
(inches)	(10-1/2)	(10-3/8)	(7-1/2)

#### *Clearances:*

	<b>Front</b>	<b>Rear</b>	<b>Left</b>	<b>Right</b>	<b>Top</b>
mm	(Viewing	102	—	—	25
(inches)	Distance)	(4)	—	—	(1)

**Weight:** 6.4 kg (14 lb)

**Heat Output:** 12 Watts (41 BTU/hr.)

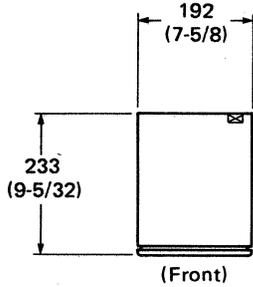
**Airflow:** Natural Convection

**Cable Length:** 2 m (78 in)

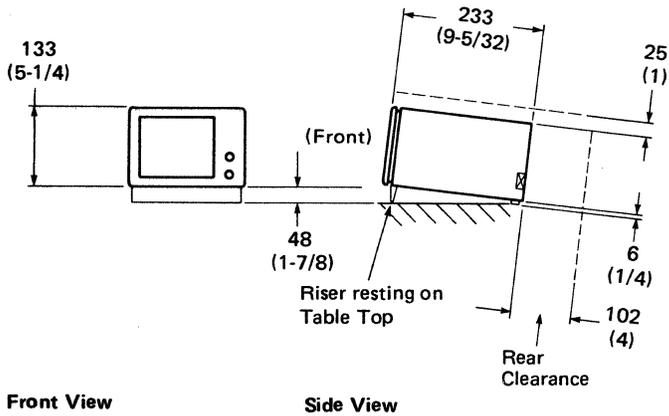
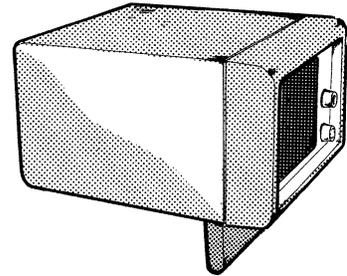
**| 4704-1 Display Station Display Monitor (Small Screen)**

**Plan View (Scale 10 mm = 0.125 m)**

Measurements are shown in millimeters (and inches).



**Top View**



**Front View**

**Side View**

## 4704-1 DISPLAY STATION DISPLAY MONITOR (Small Screen)

### Specifications

#### *Dimensions:*

	<b>Front</b>	<b>Side</b>	<b>Height</b>
mm	192	233	133
(inches)	(7-5/8)	(9-5/32)	(5-1/4)

#### *Clearances:*

	<b>Front</b>	<b>Rear</b>	<b>Right</b>	<b>Left</b>	<b>Top</b>
mm	(Viewing	102	—	—	25
(inches)	Distance)	(4)	—	—	(1)

**Weight:** 3.4 kg (7.5 lb)

**Heat Output:** 12 Watts (41 BTU/hr.)

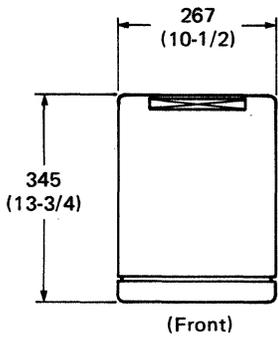
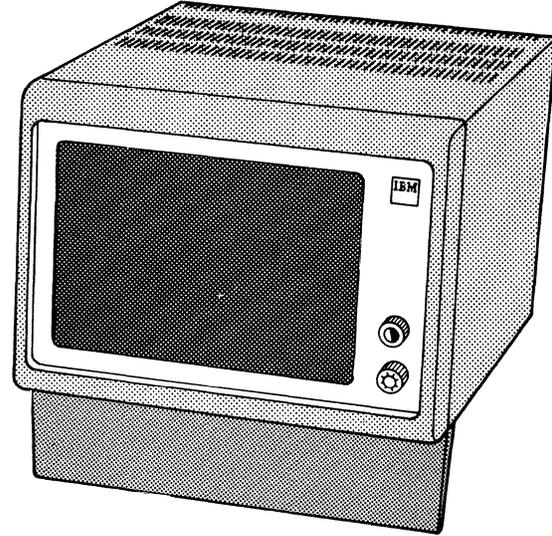
**Airflow:** Natural Convection

**Cable Length:** 2 m (78 in)

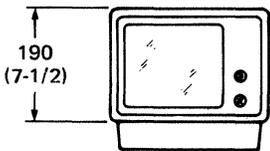
## 4704-2 Display Module

Plan View (Scale 10 mm = 0.125 m)

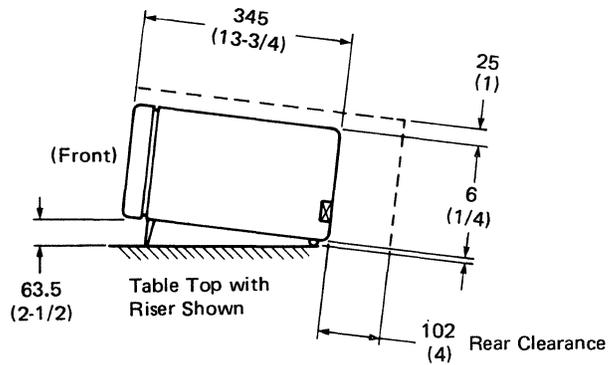
Measurements are shown in millimeters (and inches).



Top View



Front View



Side View

## 4704-2 DISPLAY MODULE

### Specifications

#### *Dimensions:*

	<b>Front</b>	<b>Side</b>	<b>Height</b>
mm	267	345	190
(inches)	(10-1/2)	(13-3/4)	(7-1/2)

#### *Clearances:*

	<b>Front</b>	<b>Rear</b>	<b>Right</b>	<b>Left</b>	<b>Top</b>
mm	(Viewing	102	--	--	25
(inches)	distance)	(4)	--	--	(1)

**Weight:** Under 11.25 kg (25 lb)

**Heat Output:** 72 Watts (245 BTU/hr)

**Note:** The heat output figures are for basic configuration consisting of a display module and keyboard; add four watts for a magnetic stripe unit; keyboard and PIN keypad heat are negligible.

**Airflow:** Natural Convection

#### *Power Requirements:*

**Volts (60 Hz):** 100, 110, 120

**Volts (50 Hz):** 100, 110, 200, 220, 230, 240

**kVA:** 0.15

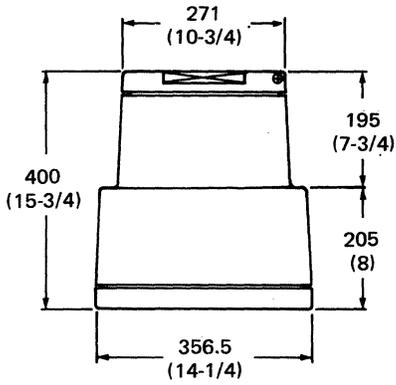
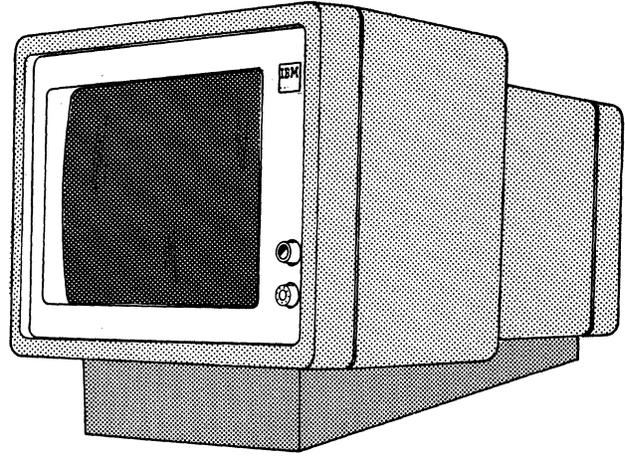
**Power Cords and Plugs:** See Appendix C and Appendix D.

**Cable Length:** The 4704-2 Display Module does not have a permanently-attached signal cable. You provide the coaxial cable and determine its length.

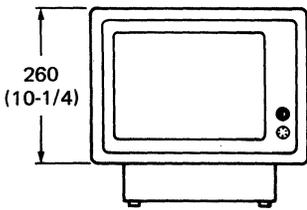
### 4704-3 Display Module

Plan View (Scale 10 mm = 0.125 m)

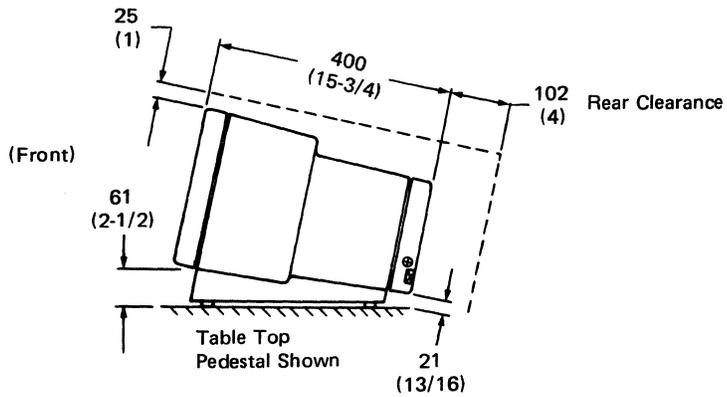
Measurements are shown in millimeters (and inches).



Top View



Front View



Side View

## 4704-3 DISPLAY MODULE

### Specifications

#### *Dimensions:*

	<b>Front</b>	<b>Side</b>	<b>Height</b>
mm	356.5	400	260
(inches)	(14-1/4)	(15-3/4)	(10-1/4)

#### *Clearances:*

	<b>Front</b>	<b>Rear</b>	<b>Right</b>	<b>Left</b>	<b>Top</b>
mm	(Viewing	102	--	--	25
(inches)	distance)	(4)	--	--	(1)

**Weight:** Under 11.25 kg (25 lb)

**Heat Output:** 60 Watts (205 BTU/hr)

**Note:** The heat output figures are for basic configuration consisting of a display module and keyboard; add four watts for a magnetic stripe unit; keyboard and PIN keypad heat are negligible.

**Airflow:** Natural Convection

#### *Power Requirements:*

**Volts (60 Hz):** 100, 110, 120

**Volts (50 Hz):** 100, 110, 200, 220, 230, 240

**kVA:** 0.15

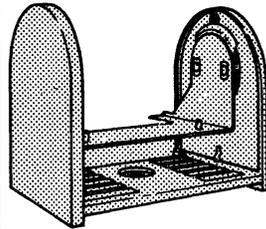
**Power Cords and Plugs:** See Appendix C and Appendix D.

**Cable Length:** The 4704-3 Display Module does not have a permanently-attached signal cable. You provide the coaxial cable and determine its length.

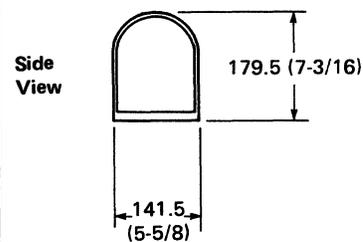
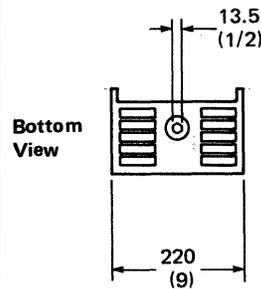
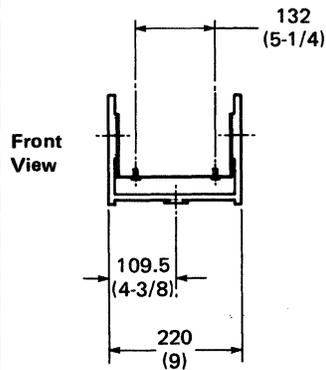
**| Cradle For 4704 Displays**

Plan View (Scale 10 mm = 0.125 m)

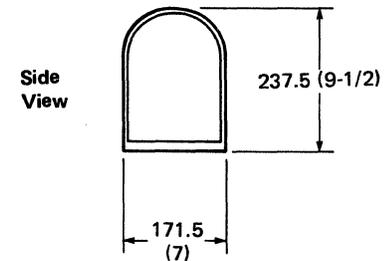
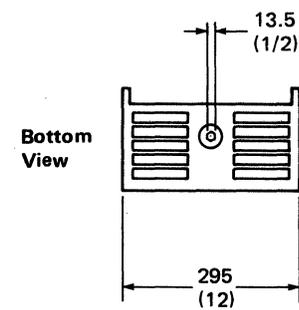
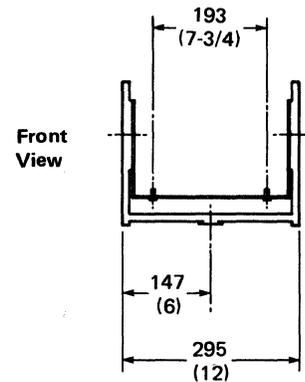
Measurements are shown in millimeters (and inches).



(For Small Displays)



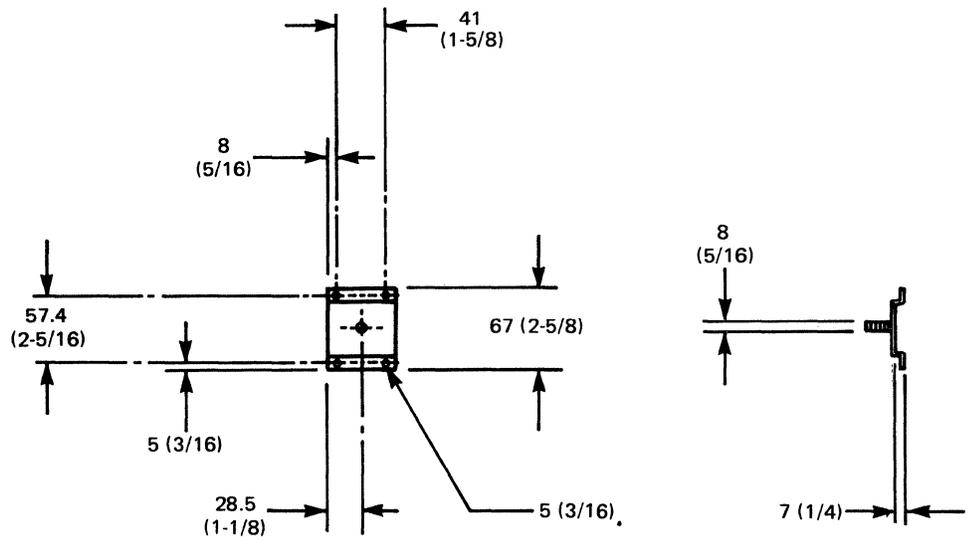
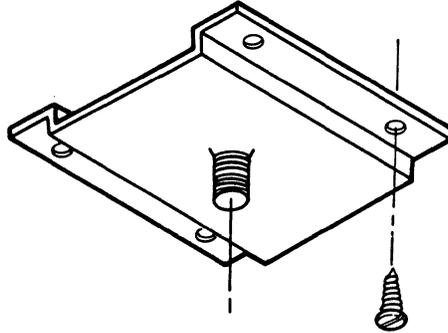
(For Large Displays)



**| Cradle Mounting Bracket**

Plan View (Scale 10 mm = 0.0625 m)

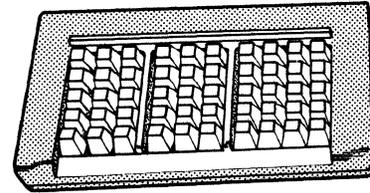
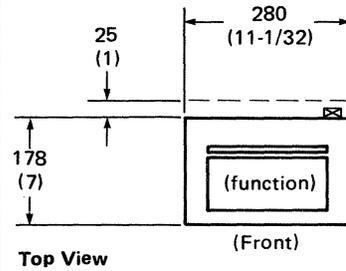
Measurements are shown in millimeters (and inches).



## | *Function Keyboard*

**Plan View (Scale 10 mm = 0.125 m)**

Measurements are shown in millimeters (and inches).



### **FUNCTION KEYBOARD**

#### **Specifications**

##### **Dimensions:**

	<b>Front</b>	<b>Side</b>	<b>Height</b>
mm	280	178	58
(inches)	(11-1/32)	(7)	(2-1/4)

##### **Clearances:**

	<b>Front</b>	<b>Rear</b>	<b>Right</b>	<b>Left</b>	<b>Top</b>
mm	(Comfortable for Hand)	25	—	—	—
(inches)		(1)	—	—	—

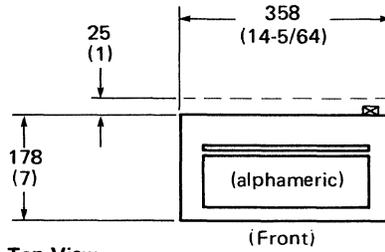
**Weight:** 1.7 kg (3.8 lb)

**Cable Length:** 2 m (78 in)

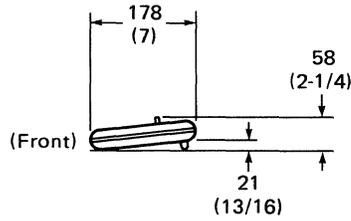
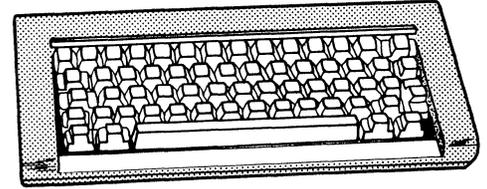
# Alphameric Keyboard

Plan View (Scale 10 mm = 0.125 m)

Measurements are shown in millimeters (and inches).



Top View



Side View

## Alphameric Keyboard

### Specifications

#### Dimensions:

	Front	Side	Height
mm	358	178	58
(inches)	(14-5/64)	(7)	(2-1/4)

#### Clearances:

	Front	Rear	Right	Left	Top
mm	(Comfortable for Hand)	25	—	—	—
(inches)		(1)	—	—	—

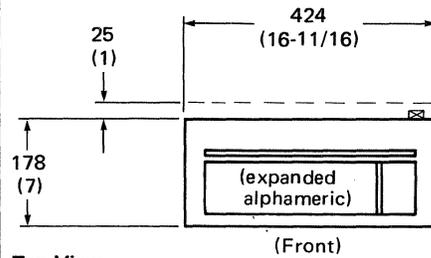
**Weight:** 1.8 kg (4 lb)

**Cable Length:** 2 m (78 in)

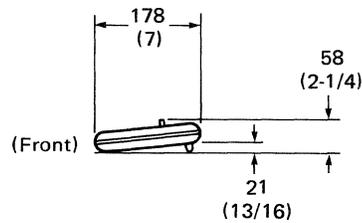
## | Expanded Alphameric Keyboard

Plan View (Scale 10 mm = 0.125 m)

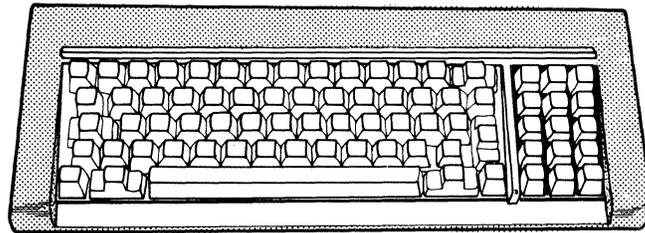
Measurements are shown in millimeters (and inches).



Top View



Side View



### EXPANDED ALPHAMERIC KEYBOARD

#### Specifications

##### Dimensions:

	Front	Side	Height
mm	424	178	58
(inches)	(16-11/16)	(7)	(2-1/4)

##### Clearances:

	Front	Rear	Right	Left	Top
mm	(Comfortable for Hand)	25	—	—	—
(inches)		(1)	—	—	—

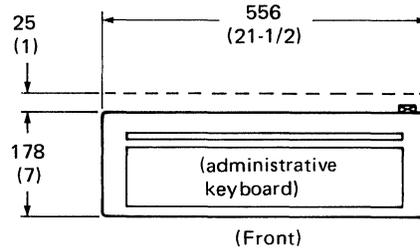
**Weight:** 2 kg (4.4 lb)

**Cable Length:** 2 m (78 in)

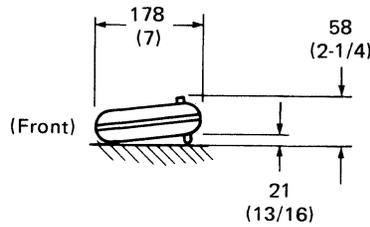
# Administrative Keyboard

## PLAN VIEW (Scale 10 mm = 0.125 m)

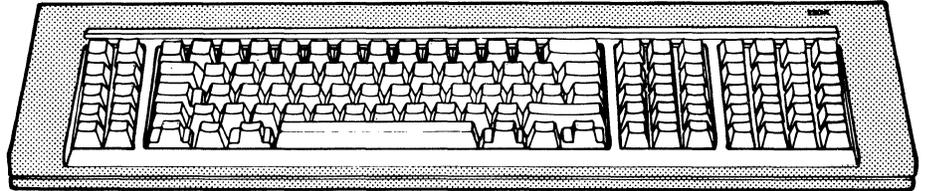
Measurements are shown in millimeters (and inches).



Top View



Side View



## ADMINISTRATIVE KEYBOARD

### Specifications

#### Dimensions:

	Front	Side	Height
mm	556	178	58
(inches)	(21-1/2)	(7)	(2-1/4)

#### Clearances:

	Front	Rear	Right	Left	Top
mm	(Comfortable	25	--	--	--
(inches)	for hand)	(1)	--	--	--

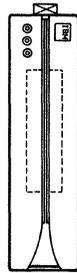
**Weight:** less than 6.75 kg (15 lb)

**Cable Length:** 2 m (78 in)

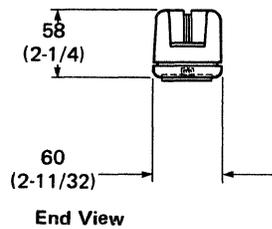
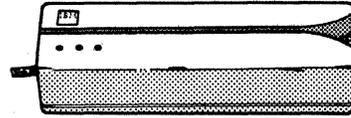
## Magnetic Stripe Unit

Plan View (Scale 10 mm = 0.0625 m)

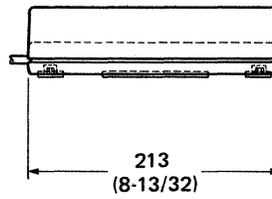
Measurements are shown in millimeters (and inches).



Top View



End View



Side View

### MAGNETIC STRIPE UNIT

#### Specifications

##### *Dimensions:*

	Front	Side	Height
mm	213	60	58
(inches)	(8-13/32)	(2-11/32)	(2-1/4)

**Clearances:** Ensure easy access.

**Weight:** 0.9 kg (2 lb)

**Heat Output:** 4 Watts (13.5 BTU/hr)

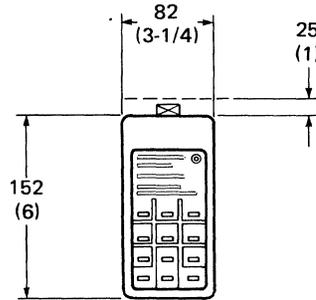
**Airflow:** Natural Convection

**Cable Length:** 2 m (78 in)

# PIN Keypad

Plan View (Scale 10 mm = 0.0625 in)

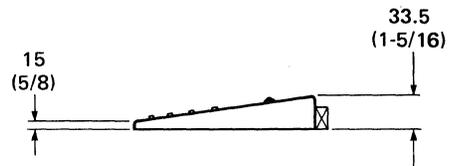
Measurements are shown in millimeters (and inches).



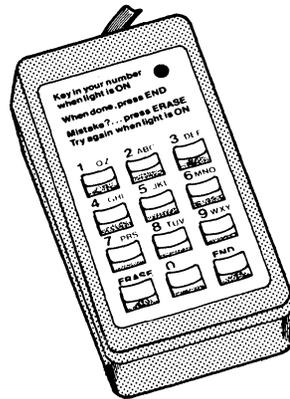
Top View



Front View



Side View



## PIN Keypad

### Specifications

#### Dimensions:

	Front	Side	Height
mm	82	152	33.5
(inches)	(3-1/4)	(6)	(1-5/16)

**Clearances:**

	<b>Front</b>	<b>Rear</b>	<b>Right</b>	<b>Left</b>	<b>Top</b>
mm	(Easy	25	—	—	(Easy
(inches)	access)	(1)	—	—	access)

**Weight:** Negligible

**Heat Output:** Negligible

**Airflow:** Natural Convection

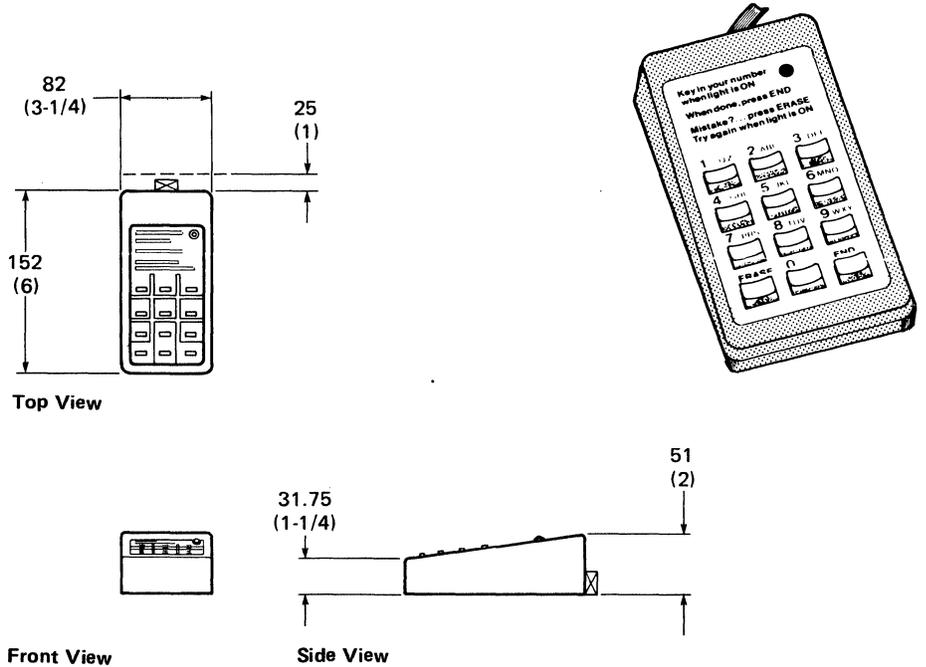
**Cable Length:** 2 m (78 in)

**Note:** We recommend a diameter (for cable opening) of at least 42 mm (1-5/8 in).

# Encrypting PIN Keypad

Plan View (Scale 10 mm = 0.0625 m)

Measurements are shown in millimeters (and inches).



## ENCRYPTING PIN KEYPAD

### Specifications

#### Dimensions:

	Front	Side	Height
mm	82	152	51
(inches)	(3-1/4)	(6)	(2)

#### Clearances:

	Front	Rear	Right	Left	Top
mm	(Easy	25	—	—	(Easy
(inches)	access)	(1)	—	—	access)

**Weight:** Negligible

**Heat Output:** Negligible

**Note:** Maximum allowed storage temperature, because of the battery, is 50°C (122°F).

***Airflow:*** Natural Convection

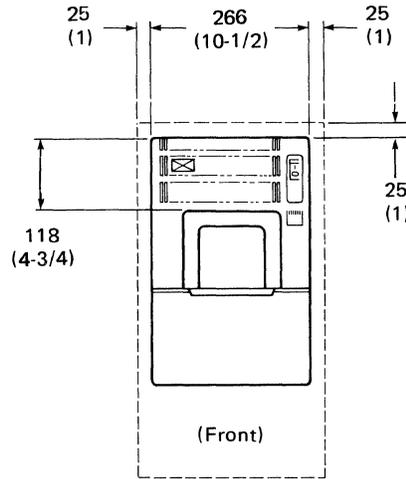
***Cable Length:*** 3 m (118 in)

**Note:** We recommend a diameter (for cable opening) of at least 42 mm (1-5/8 in).

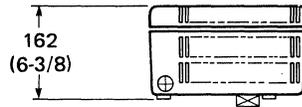
# 4710 Printer

Plan View (Scale 10 mm = 0.125 m)

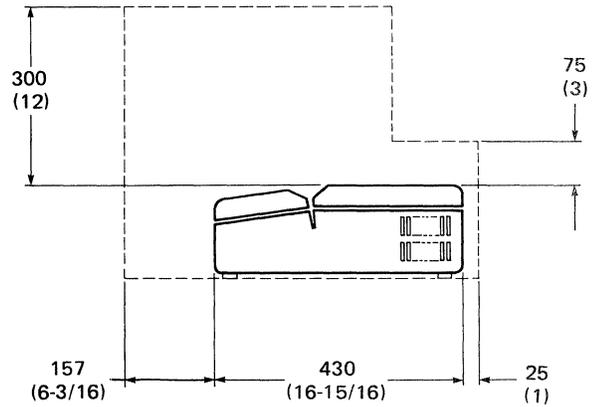
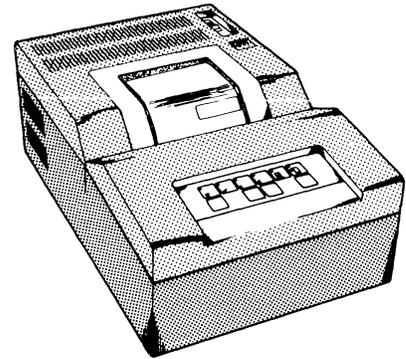
Measurements are shown in millimeters (and inches).



Top View



Rear View



Side View

## 4710 PRINTER

### Specifications

#### *Dimensions:*

	Front	Side	Height
mm	266	430	162
(inches)	(10-1/2)	(16-15/16)	(6-3/8)

#### *Clearances:*

	Front	Rear	Right	Left	Front Top	Back Top
mm	157	25	25	25	300	75
(inches)	(6-3/16)	(1)	(1)	(1)	(12)	(3)

**Weight:** 9.5 kg (21 lb)

**Heat Output:** 40 Watts (137 BTU/hr)

**Airflow:** Natural Convection

#### **Power Requirements:**

**Volts (60 Hz):** 100, 110, 120

**Volts (50 Hz):** 100, 110, 200, 220, 230, 240

**kVA:** 0.1

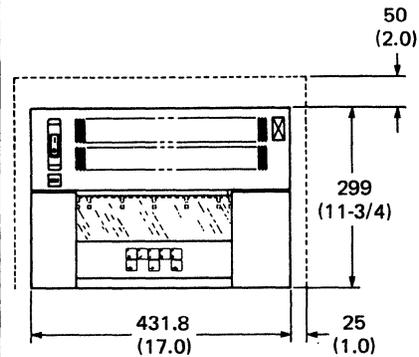
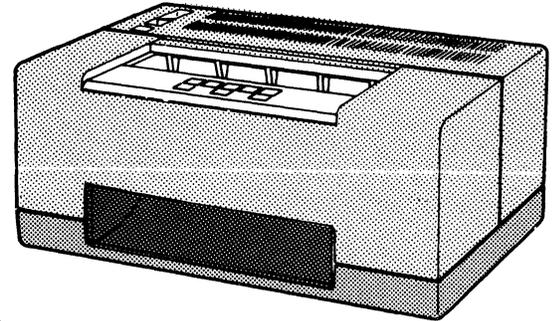
**Power Cords and Plugs:** See Appendix C and Appendix D.

**Cable Length:** Loop Attachment = 2.1-m (82-in)

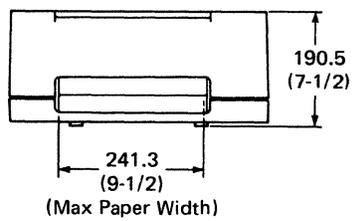
**| 4720 Printer (Models 1 and 3)**

**Plan View (Scale 10 mm = 0.125 m)**

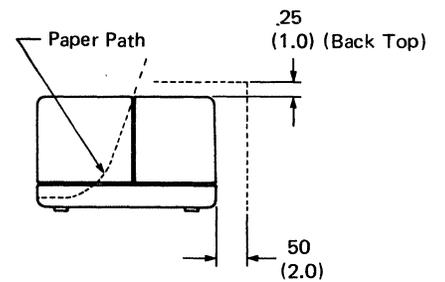
Measurements are shown in millimeters (and inches).



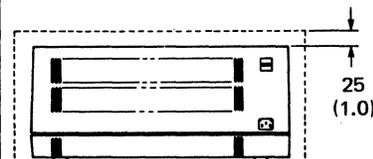
**Top View**



**Front View**



**Right Side View**



**Back View**

## 4720 PRINTER (MODELS 1 AND 3)

### Specifications

#### *Dimensions:*

	<b>Width (Front &amp; Rear)</b>	<b>Length (Side)</b>	<b>Height</b>
mm	431.8	299.0	190.5
(inches)	(17)	(11-3/4)	(7-1/2)

#### *Clearances:*

	<b>Front</b>	<b>Rear</b>	<b>Sides</b>	<b>Front Top</b>	<b>Back Top</b>
mm	**	50	25	**	25*
(inches)		(2)	(1)		(1)

\* "Back Top" is the top part of the printer that extends from the back to 25-mm (1.0-in) from where the forms exit the printer.

\*\* Ensure that the "Front" and "Top Front" area is totally clear so you can insert forms and remove them at the top of the printer. Total clearance is also needed for effective use of the operator panel.

**Weight:** Under 14 kg (30 lb)

**Heat Output:** 96 Watts (308 BTU/hr)

**Airflow:** Natural Convection

#### **Power Requirements:**

**Volts (60 Hz):** 100, 110, 120

**Volts (50 Hz):** 100, 110, 200, 220, 230, 240

**kVA:** 0.158

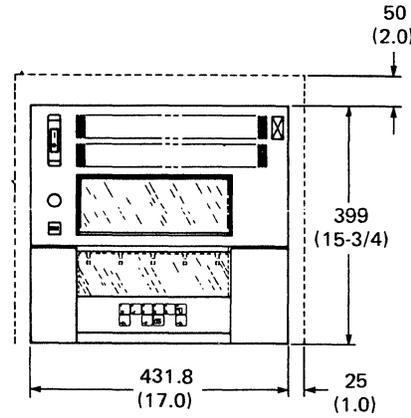
**Power Cord and Plug:** See Appendix C and Appendix D.

**Cable Length:** Loop Attachment = 2.1 m (82 in)

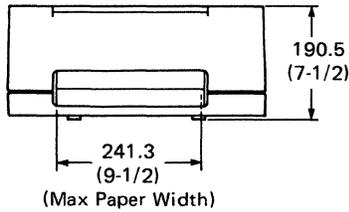
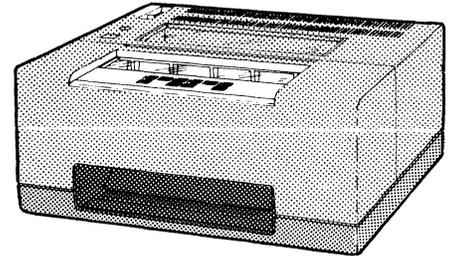
**| 4720 Printer (Models 2 and 4)**

**Plan View (Scale 10 mm = 0.125 m)**

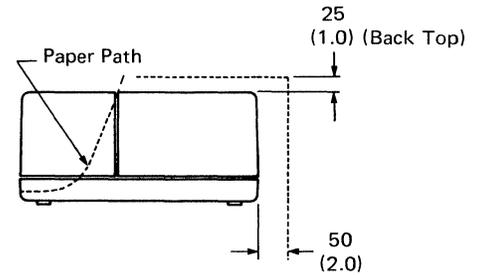
Measurements are shown in millimeters (and inches).



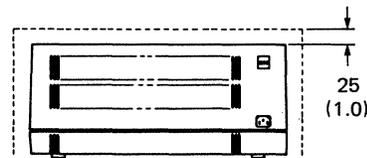
**Top View**



**Front View**



**Right Side View**



**Back View**

## 4720 PRINTER MODELS 2 AND 4

### Specifications

#### *Dimensions:*

	<b>Width (Front/Rear)</b>	<b>Length (Side)</b>	<b>Height</b>
mm	431.8	399.0	190.5
(inches)	(17)	(15-3/4)	(7-1/2)

#### *Clearances:*

	<b>Front</b>	<b>Rear</b>	<b>Sides</b>	<b>Front Top</b>	<b>Back Top</b>
mm	**	50	25	**	25*
(inches)		(2)	(1)		(1.0)

\* "Back Top" is the top part of the printer that extends from the back to 25 mm (1.0 in) from where the forms exit the printer.

\*\* Ensure that the "Front" and "Top Front" are totally clear so you can put forms in and take them out the top of the printer. Total clearance is also needed for effective use of the operator panel.

**Weight:** Under 20 kg (44 lb)

**Heat Output:** 96 Watts (308 BTU/hr)

**Airflow:** Natural Convection

#### **Power Requirements:**

**Volts (60 Hz):** 100, 110, 120

**Volts (50 Hz):** 100, 110, 200, 220, 230, 240

**kVA:** 0.158

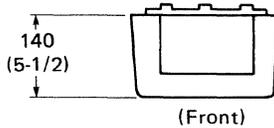
**Power Cord and Plug:** See Appendix C and Appendix D.

**Cable Length:** Loop Attachment = 2.1 m (82 in)

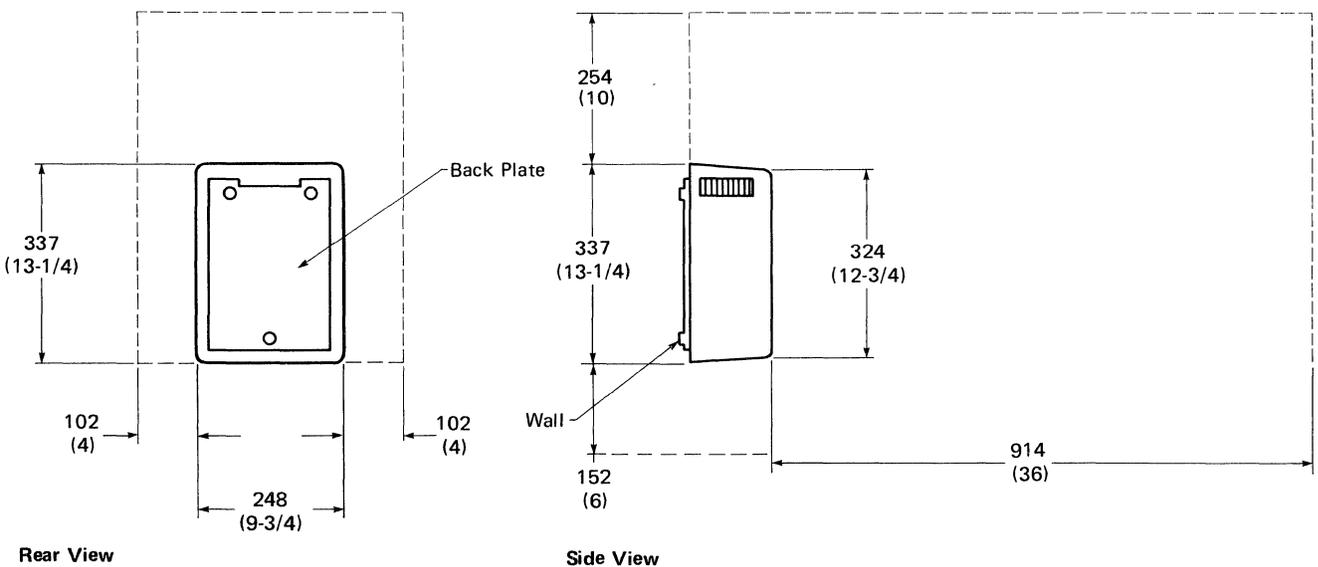
## 3603 Terminal Attachment Unit (Models 1, 2, and 3)

Plan View (Scale 10 mm = 0.125 m)

Measurements are shown in millimeters (and inches).

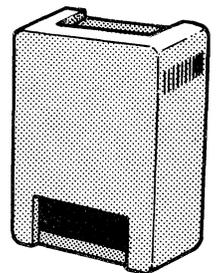


Top View



### Notes:

1. During operation, a clearance of 102 mm (4.00 in) is required on both sides of the unit for adequate air flow. It is recommended that at least 152 mm (6.00 in) of clearance be allowed at the bottom of the unit for the power and common carrier connecting cables to exit.
2. These units do not have a power ON/OFF switch, as they are intended for continuous use. To power off, you must pull the power plug. Therefore, these units should be installed in such a manner that the power attachment plug is readily accessible and removable from the receptacle. It should not be out of reach, concealed, or obstructed in any manner.
3. These units are designed for wall mounting, with the orientation as shown in the line drawing. Note that the loop cable connection is on the top.
4. Model 1 is for use only in Canada and the USA, and the Model 3 is not for use in Canada and the USA.



### 3603 TERMINAL ATTACHMENT UNIT (Models 1, 2, and 3)

#### Specifications

##### *Dimensions:*

	<b>Front</b>	<b>Side</b>	<b>Height</b>
mm	248	140	337
(inches)	(9-3/4)	(5-1/2)	(13-1/4)

##### *Clearances:*

	<b>Front</b>	<b>Rear</b>	<b>Left</b>	<b>Right</b>	<b>Top</b>	<b>Bottom</b>
mm	914	0	102	102	254	152
(inches)	(36)	(0)	(4)	(4)	(10)	(6)

**Weight:** 5.4 kg (12 lb)

**Heat Output:** 22.3 Watts (76 BTU/hr, 19.2 kcal/hr)

**Airflow:** Natural Convection

##### ***Power Requirements:***

**Volts (60 Hz):** 100, 115

**Volts (50 Hz):** 100, 110, 123.5, 220, 235

**kVA:** 0.054

**Phase:** 1

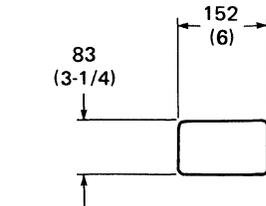
**Power Cords and Plugs:** See Appendix C and Appendix D.

**Signal Cable:** All signal cables are customer supplied; see Chapter 5, "Cabling Information," on page 5-1.

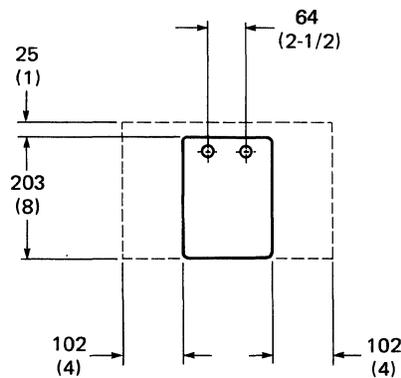
## Loop Repeater (part number 4400002)

Plan View (Scale 10 mm = 0.125 m)

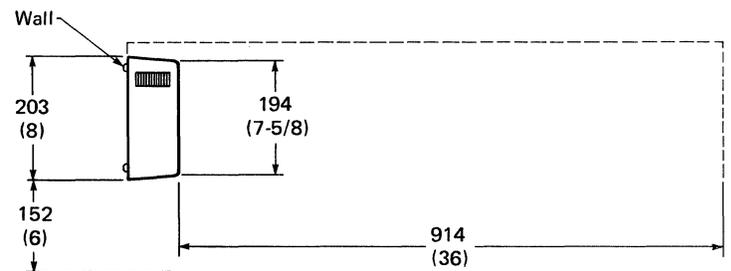
Measurements are shown in millimeters (and inches).



Top View



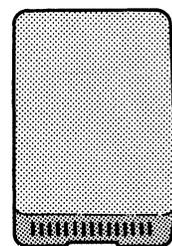
Rear View



Side View

### Notes:

1. During operation, a clearance of 101.6 mm (4.00 in) is required on both sides of the unit for adequate air flow. It is recommended that at least 152 mm (6.00 in) of clearance be allowed at the bottom of the unit for the power and signal cables to exit.
2. This unit does not have a power ON/OFF switch, as it is intended for continuous use. To power off, you must pull the power plug. Therefore, this unit should be installed in such a manner that the power attachment plug is readily accessible and removable from the receptacle. It should not be out of reach, concealed, or obstructed in any manner.
3. This unit is designed for wall mounting, with the orientation as shown in the line drawing.



**LOOP REPEATER (part number 4400002)**

**Specifications**

**Dimensions:**

	<b>Front</b>	<b>Side</b>	<b>Height</b>
mm	152	83	203
(inches)	(6)	(3-1/4)	(8)

**Clearances:**

	<b>Front</b>	<b>Rear</b>	<b>Left</b>	<b>Right</b>	<b>Top</b>
mm	914	0	102	102	25
(inches)	(36)	(0)	(4)	(4)	(1)

**Weight:** 1.36 kg (3 lb)

**Heat Output:** 3.52 Watts (12 BTU/hr, 3.02 kcal/hr)

**Airflow:** Natural Convection

**Power Requirements:**

**Volts (60 Hz):** 100, 115

**Volts (50 Hz):** 100, 110, 123.5, 220, 235

**kVA:** 0.0035

**Phase:** 1

**Power Cords and Plugs:** See Appendix C and Appendix D.

**Signal Cable:** All signal cables are customer supplied; see Chapter 5, "Cabling Information," on page 5-1.





From – To	Cable Labels		Length	Cable Type/ Conductors	Key	Part Number	Connector PNs	
	From	To					From	To

**Figure A-3. Example of a Cable Inventory Sheet**

From - To	Cable Labels		Length	Cable Type/ Conductors	Key	Part Number	Connector PNs	
	From	To					From	To
HOST DATALINE TO BRANCH CONTROLLER	CTLR-1	EXTERN MODEM	20 FT	HOST LINK/2	A	1743532	NONE	NONE
CONTROLLER-1 LOOP-1 TELLER-1	CTLR-1 LOOP-1	LOOP-1 PORT-1	8 FT	LOOP/2	f	PREASSEMBLED PN 1563155	5252765 MALE	5252766 FEMALE
TELLER-1 to TELLER-2	LOOP-1 PORT-1	LOOP-1 PORT-2	15 FT	LOOP/2	f	PREASSEMBLED PN 1563155	5252765 MALE	5252766 FEMALE
TELLER-2 TELLER-3	LOOP-1 PORT-2	LOOP-1 PORT-3	15 FT	LOOP/2	f	PREASSEMBLED PN 1563155	5252765 MALE	5252766 FEMALE
TELLER-3 TELLER-4	LOOP-1 PORT-3	LOOP-1 PORT-4	15 FT	LOOP/2	f	PREASSEMBLED PN 1563155	5252765 MALE	5252766 FEMALE
TELLER-4 RETURN TO CONTROLLER	LOOP-1 PORT-4	CTLR-1 LOOP-1	75 FT	LOOP/2	f	PREASSEMBLED PN 1563155	5252765 MALE	5252766 FEMALE
CTLR-1 LOOP-2 TO TELLER-10 OUTER LOBBY	CTLR-1 LOOP-2	LOOP-2 PORT-1	100 FT	LOOP/2	f	BULK CABLE PN 5252769	5252765 MALE	5929886 *
TELLER-10 TELLER-11	LOOP-2 PORT-1	LOOP-2 PORT-2	15 FT	LOOP/4	i	BULK CABLE PN 5252913	5929886 *	5929886 *
TELLER-11 TELLER-12	LOOP-2 PORT-2	LOOP-2 PORT-3	15 FT	LOOP/4	i	BULK CABLE PN 5252913	5929886 *	5929886 *
TELLER-12 RETURN TO CONTROLLER	LOOP-2 PORT-3	CTLR-1 LOOP-2	—	LOOP/2	f	BULK CABLE PN 5252769	5929886 *	5252766 FEMALE

\* WALL-PLATE CONNECTOR

Figure A-4. Example of a Cable Inventory Sheet Filled In



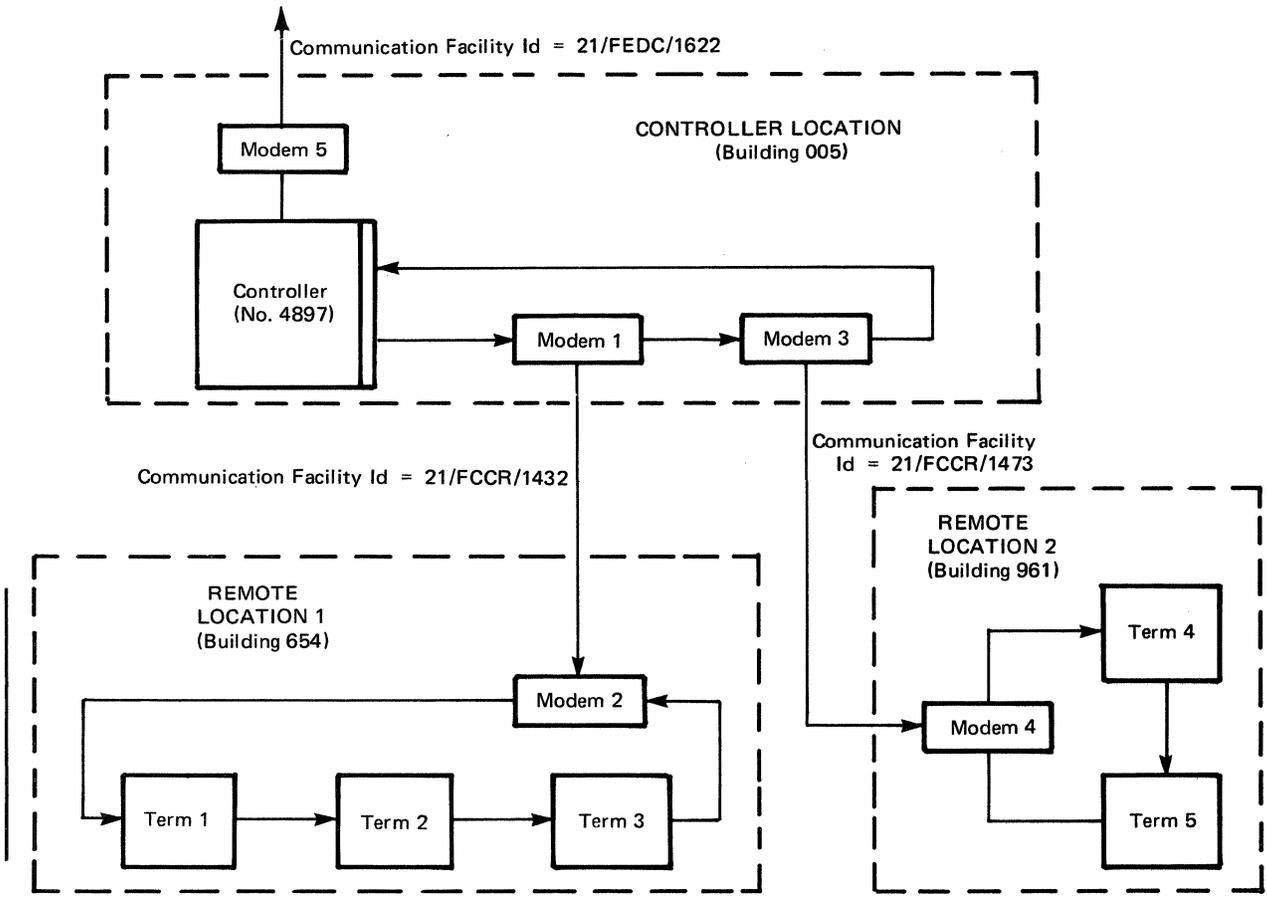


Figure A-6 (Part 1 of 2). Example of a Loop Layout

**LOOP LAYOUT FORM**

Prepared by: TC Date: 3/31/83

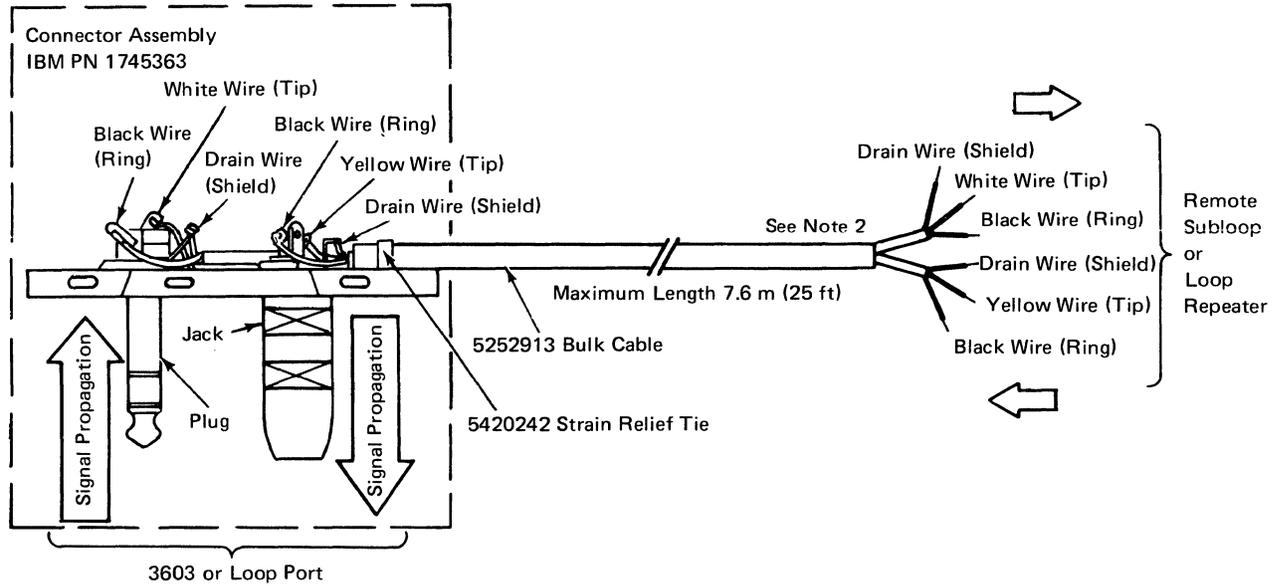
Controller Identification: 4897  
 Loop Number: 1 Location: BLDg. 005  
 Communication Facility ID: 21/FEDC/1622

Sequence on Loop	Modem or Terminal Type	Terminal Address	Location			Nearest Telephone Extension	Interconnect Communication Facility ID	Work-Station Number
			Building	Floor	Column			
1	Modem 1		005	1	AA17	2114	21/FCCR/1432	
2	Modem 2		654	2	M10	2628	21/FCCR/1432	
3	4704	1	654	2	N4	2745		5
4	4704	2	654	2	N5	3533		5
5	4704	3	654	8	F20	2546		5
6	Modem 3		005	1	AA17	2114	21/FCCR/1473	
7	Modem 4		961	1	H3	3514	21/FCCR/1473	
8	4704	4	961	1	H8	2641		2
9	4710	5	961	1	H8	2746		3

Figure A-6 (Part 2 of 2). Example of a Loop Layout



## Appendix B. Remote Loop Diagrams

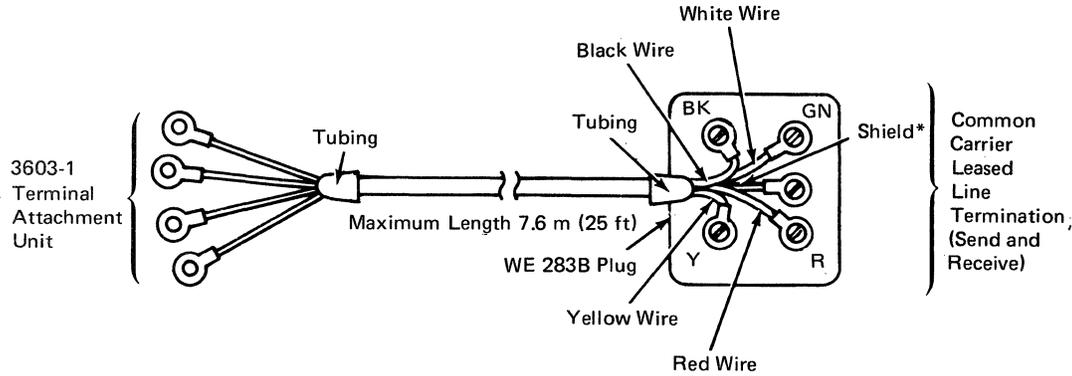


### Notes:

1. Cable PN 1745348 is used to connect a remote subloop to a remote 3603 port.  
Cable PN 1745372 is used to connect a Loop Repeater to a loop port.
2. Cable PN 1745348 has the ends stripped (as shown) and cable PN 1745372 has ring-tongue terminals.
3. Cable PN 1745348 is shown in the cabling figures as "a" and cable PN 1745372 as "g".

Figure B-1. 3603/Remote Subloop Cable (IBM part number 1745348) and Loop Repeater/Loop Port Cable (IBM part number 1745372)

**3603-1/Common Carrier Cable (IBM PN 1745350)**

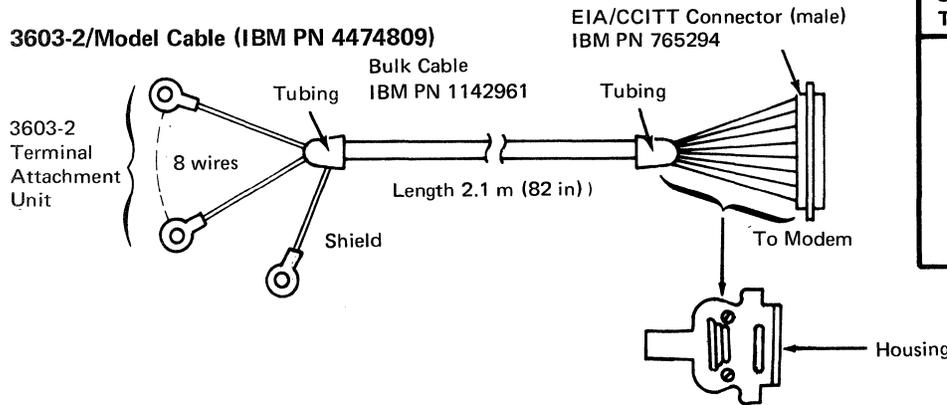


\*The shield of this cable is used for strain-relief and is fastened at the 283B plug end only. The other end is cut off at the 3603 and shrink tubing is used for a neat installation.

**Notes:**

1. This cable is used to connect the common carrier leased line termination to the leased line input/output terminals in the 3603 Model 1. The adapter cable, IBM PN 1741656, might also be necessary. For use only in Canada and the U.S.A.
2. Shown in cabling figures as "b".

**3603-2/Model Cable (IBM PN 4474809)**

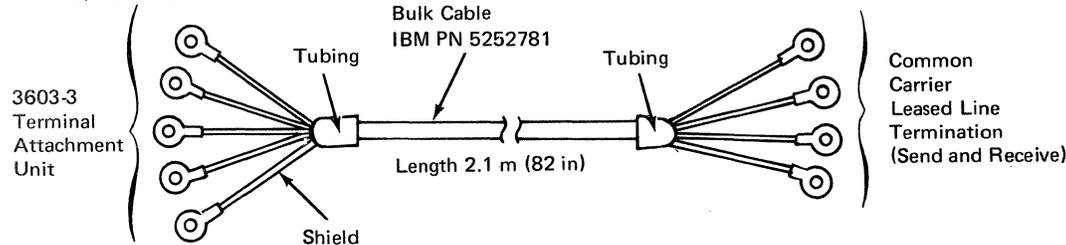


3603 TB1	Connector Pin	Color Body or Trace
8	1	Yellow
10	2	Black
9	3	Pink/blue
6	4	Red
3	7	Blue
2	20	Brown
7	23	Orange
4	24	White

**Notes:**

1. This cable is used to connect the associated modem to the input/output terminals in the 3603 Model 2. In the UK, adapter cable IBM PN 1727744 is also required.
2. Shown in the cabling figures as "b".

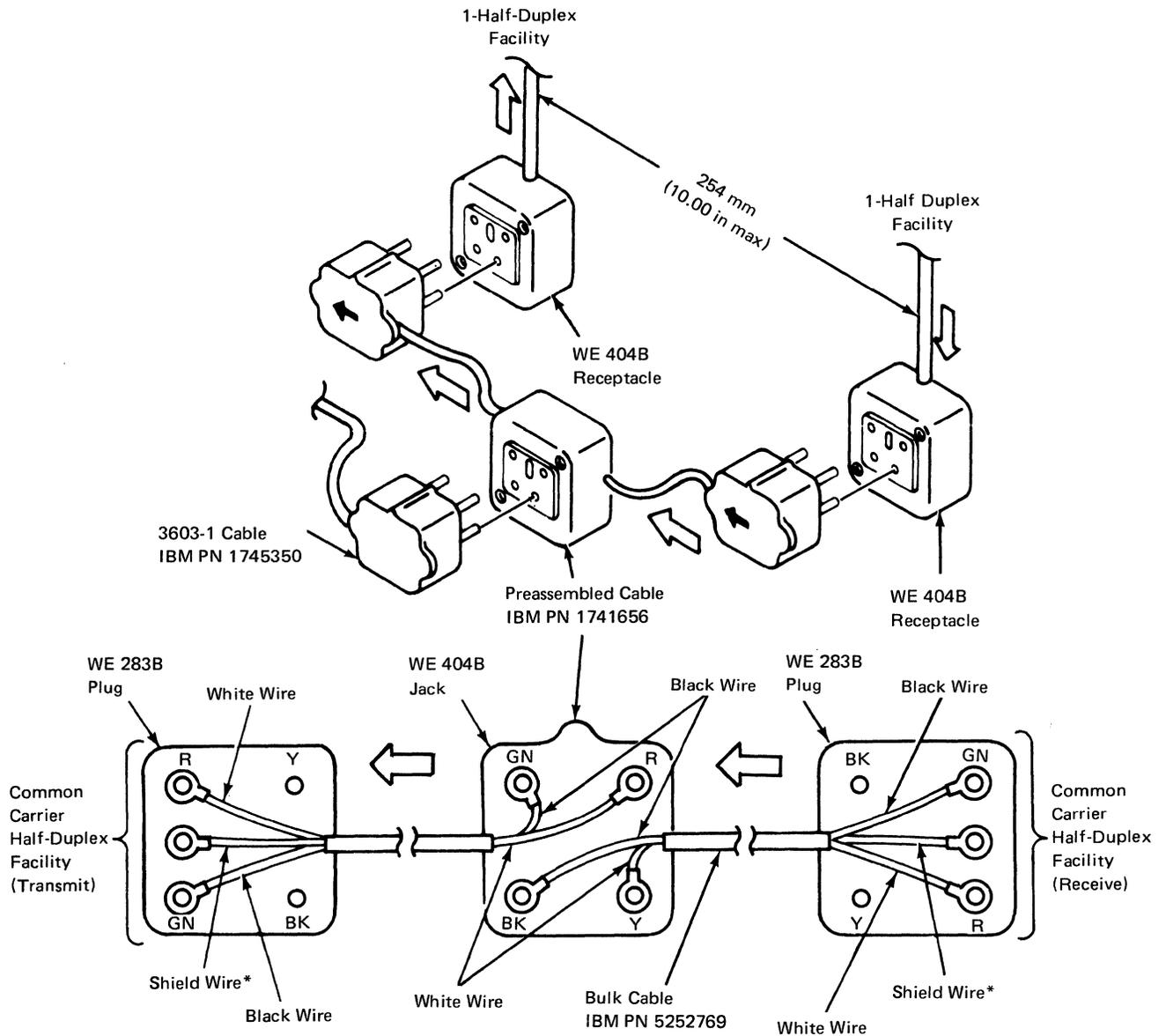
**3603-3/Common Carrier Cable (IBM PN 4400029)**



**Notes:**

1. This cable is used to connect the common carrier leased line termination to the leased line input/output terminals in the 3603 Model 3. Not for use in Canada and the U.S.A.
2. Shown in the cabling figures as "b".

**Figure B-2. 3603 (all models) to Common Carrier Line Cable**



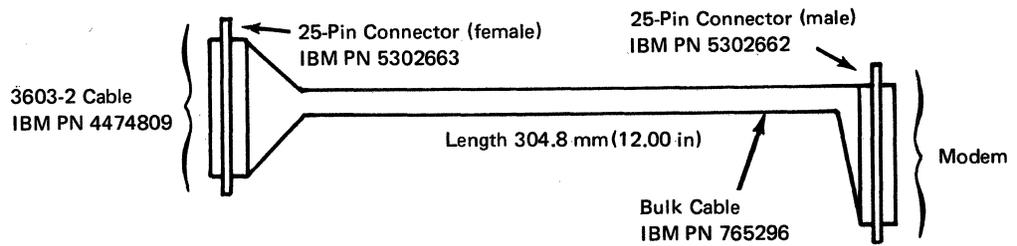
\* Used as a strain relief only

**Notes:**

1. This adapter cable is used to connect two half-duplex communications facilities to the common carrier leased line input/output cable. For use only in the U.S.A./Canada/UK.
2. If you use this cable in the UK, also see Figure B-4 on page B-4.

An arrow is imprinted on top of each male connector to indicate the transmit and receive lines.

**Figure B-3. Common Carrier Adapter (IBM Part Number 1741656)**



Connector Pin IBM PN 5302663 (to 3603 cable)	Color Body/Tracer	Connector Pin IBM PN 5302662 (to modem)
1	Black	1
2	Brown	2
3	Red	3
4	Orange	4
7	Blue	7
20	Brown/Red	20
23	Aqua	↻ 11
—	(Jumper: 11/23)	↻ 23
24	(not used)	—

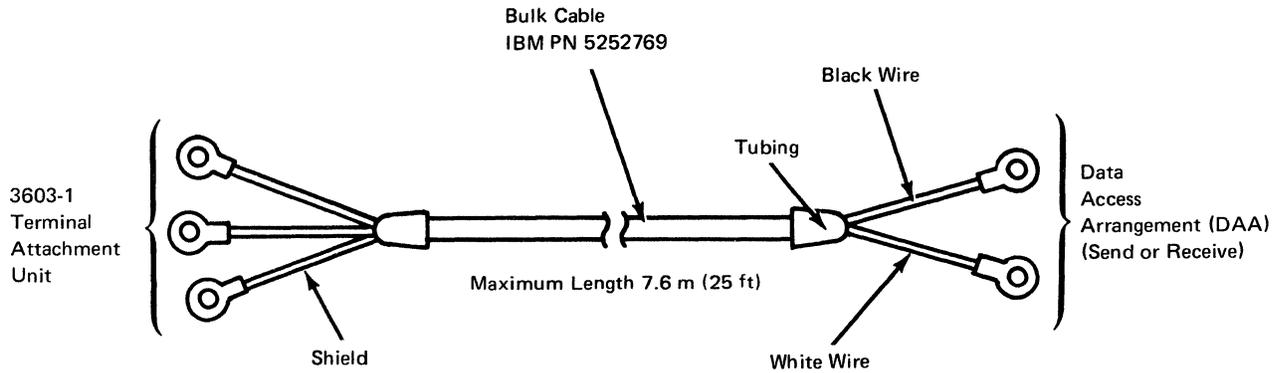
Remaining wires are not used.

**Notes:**

1. This adapter cable is used to connect the associated modem to the 3603 Model 2 modem cable. For use only in the UK.
2. Connector IBM PN 5302662 uses hood IBM PN 5824321; connector IBM PN 5302663 uses hood IBM PN 765295. Tape cable insulation to fit strain reliefs.

Common Carrier Adapter Cable (IBM PN 1741656) and UK Modem Adapter Cable (IBM PN 1727744)

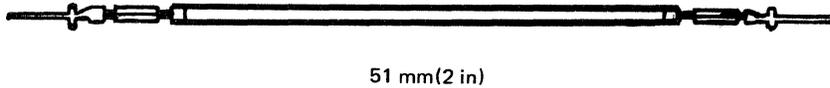
Figure B-4. UK Modem Adapter Cable



**Notes:**

1. This cable is used to connect a DAA to the input/output terminals in the 3603 Model 1. For use only in Canada and the U.S.A.
2. Shown in cabling figures as "d".

**Figure B-5. 3603/DAA Cable (IBM part number 1745349)**



**Note:** This jumper wire is used to connect the connector located on the backplate assembly of the 3603 Model 1 to obtain the correct transmit signal attenuation level specified by the common carrier for the attached DAA. Five of the preassembled jumpers and one pin removal tool (IBM PN 453705) are supplied by IBM with each 3603-1.

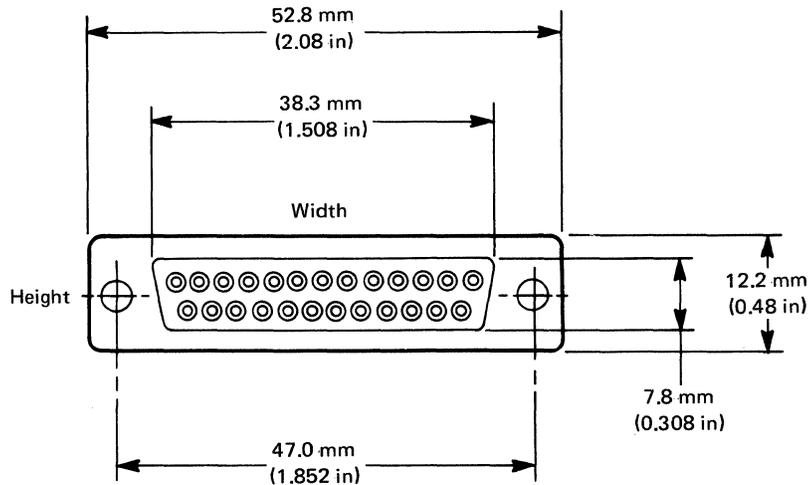
**Figure B-6. 3603 Jumper (IBM part number 1745353)**

Common-Carrier-Provided  
 Type 404B or 549A Surface Mount, or  
 Type 493A Flush Mount (or equivalent)  
 Jacks



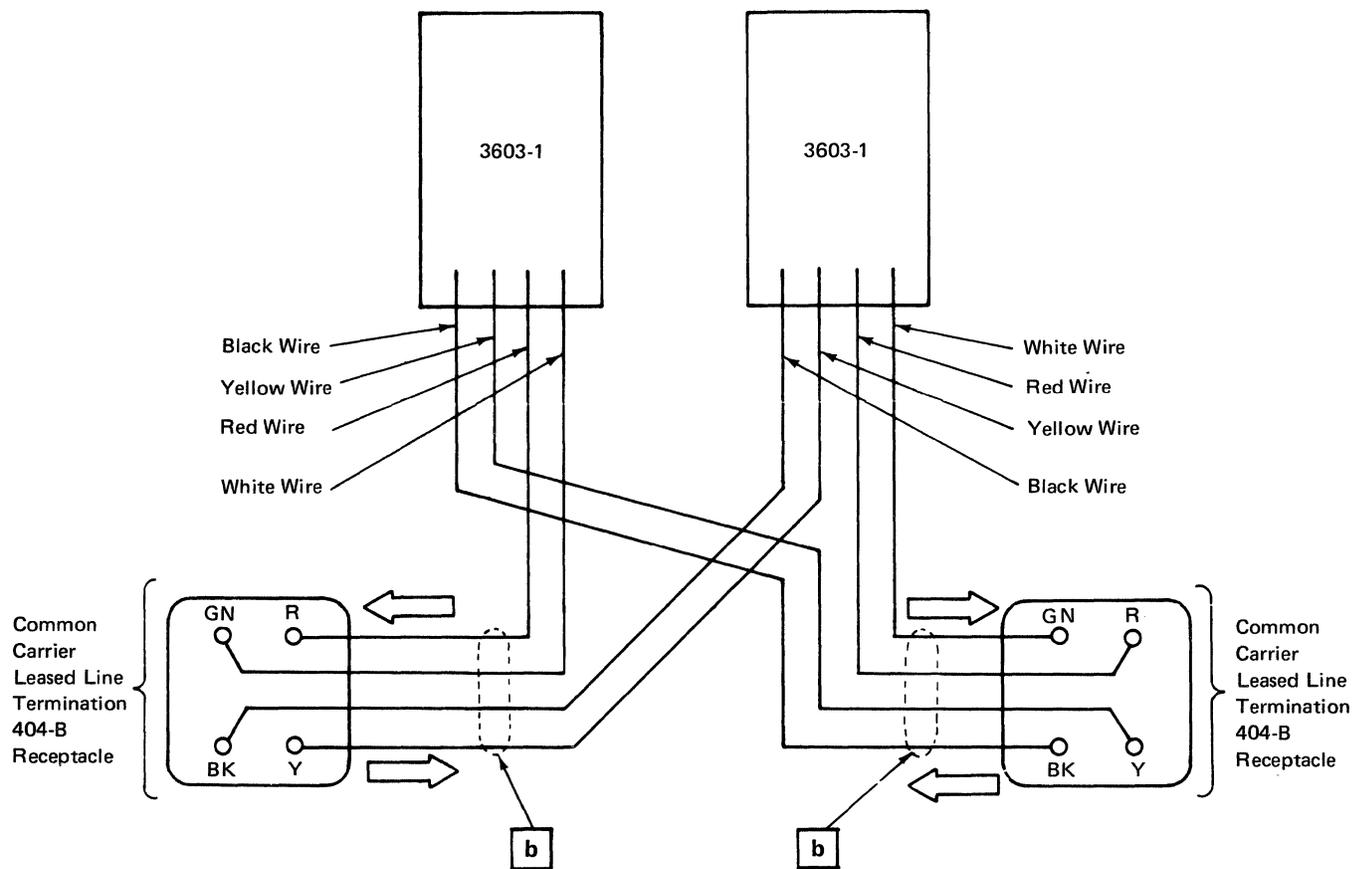
**Note:** When two half-duplex leased line (2-wire) common carrier facilities are used to service a 3603 Model 1, and they are terminated in two jacks, the jacks must be installed within 254 mm (10 in) of each other, and adapter IBM PN 1741656, or equivalent, is used in conjunction with cable assembly IBM PN 1745350, or equivalent.

**Figure B-7. Line Termination Jacks**



**Note:** Cable connectors are protected by a hood and strain relief assembly (IBM PN 765295) with the following overall dimensions: 55.9 mm (2.2 in) wide by 19.8 mm (0.78 in) high.

**Figure B-8. 25-Pin EIA/CCITT Female Connector (IBM part number 765294)**



**b** Preassembled 4-conductor cables, IBM PN 1745350, modified by removing the outer insulation and shield 254 mm (10 in) back from the tip of the ring tongue terminals, to permit connection to the 3603 Model 1s, as shown.

➡ Signal propagation.

**Figure B-9. Connection of Full-Duplex Communication Facilities to Remote 3603-1**

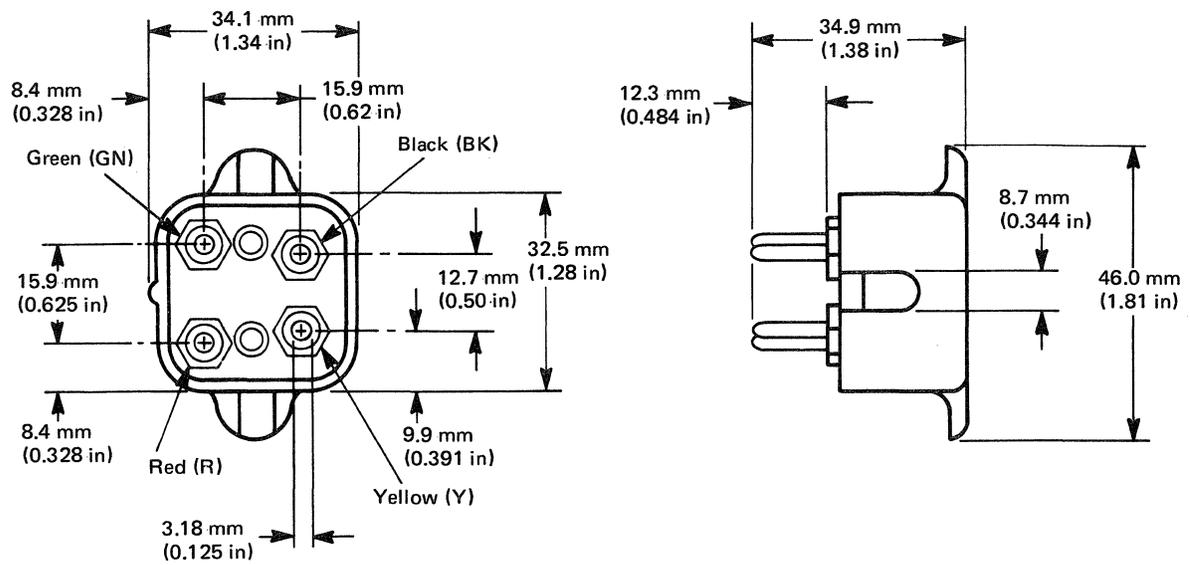


Figure B-10. Type WE283B Plug

# Appendix C. Power Cords, Plugs, and Receptacles

## | Power Cords

Information concerning the power cord specifications for all devices are shown in Figure C-1, Figure C-2, and Figure C-3. The standard power cord length for all 4700 system devices is 1.83 m (6 ft) for U.S.A. and Canada, 3 m (9.8 ft) for World Trade.

## | Plugs and Receptacles

The types of *power cords* shipped with each device in the U.S.A. and Canada are as follows:

- All 4700 devices and the 3603 use the *Type E* power cord.
- The Loop Repeater uses the *Type D* power cable.

The types of *power plugs* shipped with each device in the U.S.A. and Canada are as follows:

- All 4700 devices and the 3603 use -
  - The *Type H* nonlocking
  - The *Type J* locking
- The Loop Repeater uses only the *Type H* nonlocking plug.

Other information concerning the power cords, plugs, and receptacles shipped with devices in the U.S.A and Canada are indicated in Figure C-1, Figure C-2 , and Figure C-3.

Power Cord Style	Cable Nominal OD		Number of Shields	Conductors			
				Quantity	Nominal OD		AWG Number
	mm	in			mm	in	
D	8.89	0.350	0	3	1.19	0.047	18
E	8.89	0.350	1	3	1.19	0.047	18

Figure C-1. Power Cord Specifications

Provided by IBM					Provided by Customer					
Plug Type	Waterproof	Nonlock	Lock	IBM Reference	Volts	Amps	Phase	Wires	Inline Connector	Receptacle
H		5-15P		NEMA	125	15	1	3	5-15R	5-15R
J			L5-15P	NEMA	125	15	1	3	L5-15R	L5-15R

Figure C-2. Plug Types

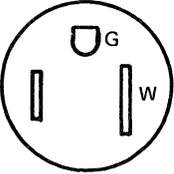
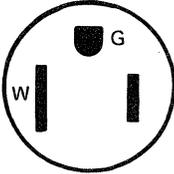
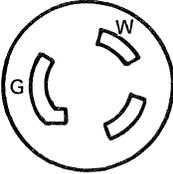
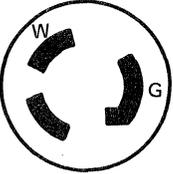
Type	Nonlocking Plugs and Receptacles		Locking Type Plugs and Receptacles	
	15 Amperes		15 Amperes	
	Receptacle	Plug	Receptacle	Plug
125V	 5-15R	 5-15P	 L5-15R	 L5-15P

Figure C-3. Plugs and Receptacles

## Appendix D. Power Cords and Plugs (World Trade)

### WT Power Plug Requirements for 4700

#### | Installation of a Power Plug

Because different plugs are used in different countries, it is difficult to cover all plug installations in one procedure. However, you must consider three things:

- Ensure that the shield of the power cord always has a good electrical connection to the branch circuit ground.
- Ensure that the grounding wire and/or the drain (shield) wire will not contact (touch) the other (hot) wires.
- Ensure that the grounding wire (green/green-yellow) is properly attached to the grounding terminal in the plug.

#### Notes:

1. World Trade E/ME/A countries not listed will receive power cords with attached plugs as shown in Figure D-4.
2. World Trade A/FE countries not listed will receive power cords with attached plugs as shown in Figure D-3 (for voltages under 200 V) or as shown in Figure D-6 (for voltages of 200 V and above).
3. If World Trade A/FE countries have receptacles that do not match the power plugs supplied by IBM, the devices will be shipped without a plug on the end of the power cord.

Country	Figure Reference	Country	Figure Reference
Algeria	D4	Jamaica	D3
Argentina	D12	Japan	See Note 1
Australia	D6		
Austria	D4	Malaysia	D5
		Mexico	D3
Bahamas	D3		
Barbados	D3	Netherlands	D4
Belgium	D4	Netherlands Antilles	D3
Bermuda	D3	New Zealand	D6
Bolivia	D3	Nicaragua	D3
Brazil	D3	Norway	D4
Bulgaria	D4		
		Panama	D3
Chile	D10	Paraguay	D12
Columbia	D3	Peru	D13
Costa Rica	D3	Philippines	D3
		Poland	D4
Denmark	D8	Portugal	D4
Dominican Republic	D3		
		Rumania	D4
Ecuador	D3		
El Salvador	D3	Saudi Arabia	D5 (See Note 2)
		Singapore	D5
Finland	D4	South Africa	D7
France	D4	South Korea	D3
		Spain	D4
Germany	D4	Surinam	D13
Greece	D4	Sweden	D4
Guatemala	D3	Switzerland	D2
Hong Kong	D5	Taiwan	D3
Honduras	D3	Thailand	D13
Hungary	D4	Turkey	D4
Iceland	D4	United Kingdom	D5
Indonesia	D1	Uruguay	D12
Iran	D4		
Ireland	D5	Venezuela	D3
Israel	D11		
Italy	D10	Yugoslavia	D4

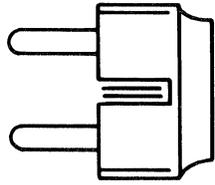
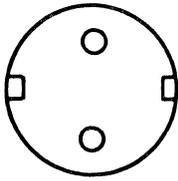
**Notes:**

1. Japan:

- If you specify a nonlocking plug, you will get the plug in Figure D3.
- If you specify a locking plug, you will get the plug in Figure D9.

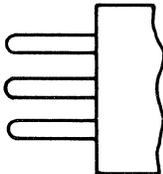
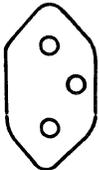
2. Saudi Arabia:

- If you specify a low voltage plug, you will get the U.S.A. plugs shown in Appendix C.



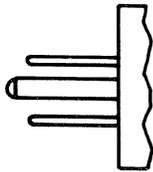
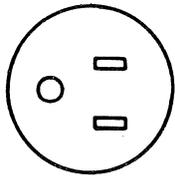
Indonesia

Figure D-1. Plug with Side Earthing (Ground) Pin — 16A Max, 250V



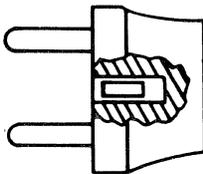
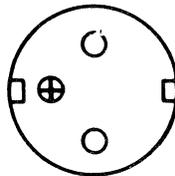
Switzerland

Figure D-2. Plug with Earthing (Ground) Pin — 10A Max, 250V



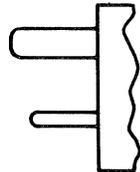
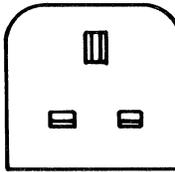
Bahamas	Ecuador	Nicaragua
Barbados	El Salvador	Panama
Bermuda	Guatemala	Philippines
Bolivia	Honduras	South Korea
Brazil	Jamaica	Taiwan
Columbia	Japan	Venezuela
Costa Rica	Mexico	
Dominican Republic	Netherlands Antilles	

Figure D-3. Plug with Earthing (Ground) Pin — Same plug as required for U.S.A. — 15A Max, 125V



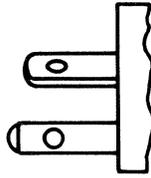
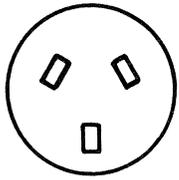
Algeria	Hungary	Spain
Austria	Iceland	Sweden
Belgium	Iran	Turkey
Bulgaria	Netherlands	Yugoslavia
Finland	Norway	E/ME/A Countries
France	Poland	Not listed elsewhere
Germany	Portugal	
Greece	Rumania	

Figure D-4. Plug with Contact Tube and Side Earthing (Ground) — 16A Max, 250V



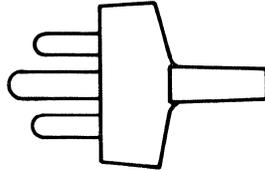
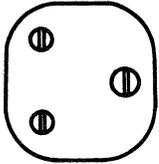
Hong Kong  
Ireland  
United Kingdom  
Malaysia  
Saudi Arabia  
Singapore

Figure D-5. Plug with Earthing (Ground) Pin — 13A Max, 250V



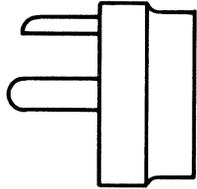
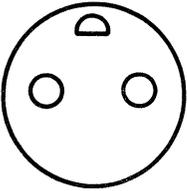
Australia  
New Zealand

Figure D-6. Plug with Earthing (Ground) Pin — 10A Max, 250V



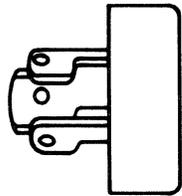
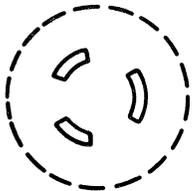
South Africa

Figure D-7. Plug with Earthing (Ground) Pin — 16A Max, 250V



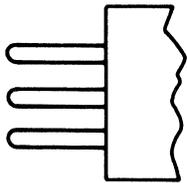
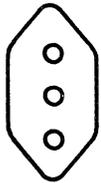
Denmark

Figure D-8. Plug with Earthing (Ground) Pin — 10A Max, 250V



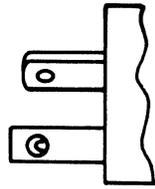
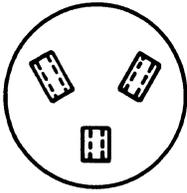
Japan

Figure D-9. Locking Plug with Earthing (Ground) Pin — 15A Max, 125V



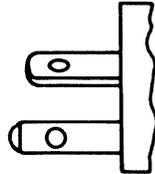
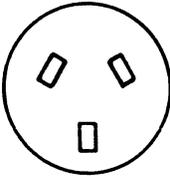
Italy  
Chile

Figure D-10. Plug with Earthing (Ground) Pin — 16A Max, 250V



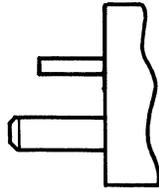
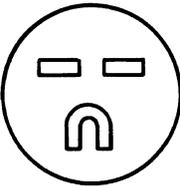
Israel

**Figure D-11. Plug with Earthing (Ground) Pin — 16A Max, 250V**



Argentina  
Paraguay  
Uruguay

**Figure D-12. Plug with Earthing (Ground) Pin — 15A Max, 250V**



Peru  
Thailand  
Surinam

**Figure D-13. Plug with Earthing (Ground) Pin — 15A Max**



## Appendix E. Voltage Limitations

Frequency	Voltage			Devices				
	Nom	Min	Max	4701	4704	4710	4720	3603
	50 Hz	100	90	110	X	X	X	X
110		90.5	119	X	X	X	X	X
200		180	220	X	X	X	X	
220		193	238	X	X	X	X	X
230		202	249	X	X	X	X	
240		210	259	X	X	X	X	
60 Hz	100	90	110	X	X	X	X	X
	110	90.6	119	X	X	X	X	
	120	104	127	X	X	X	X	

Figure E-1. Voltage Limitations

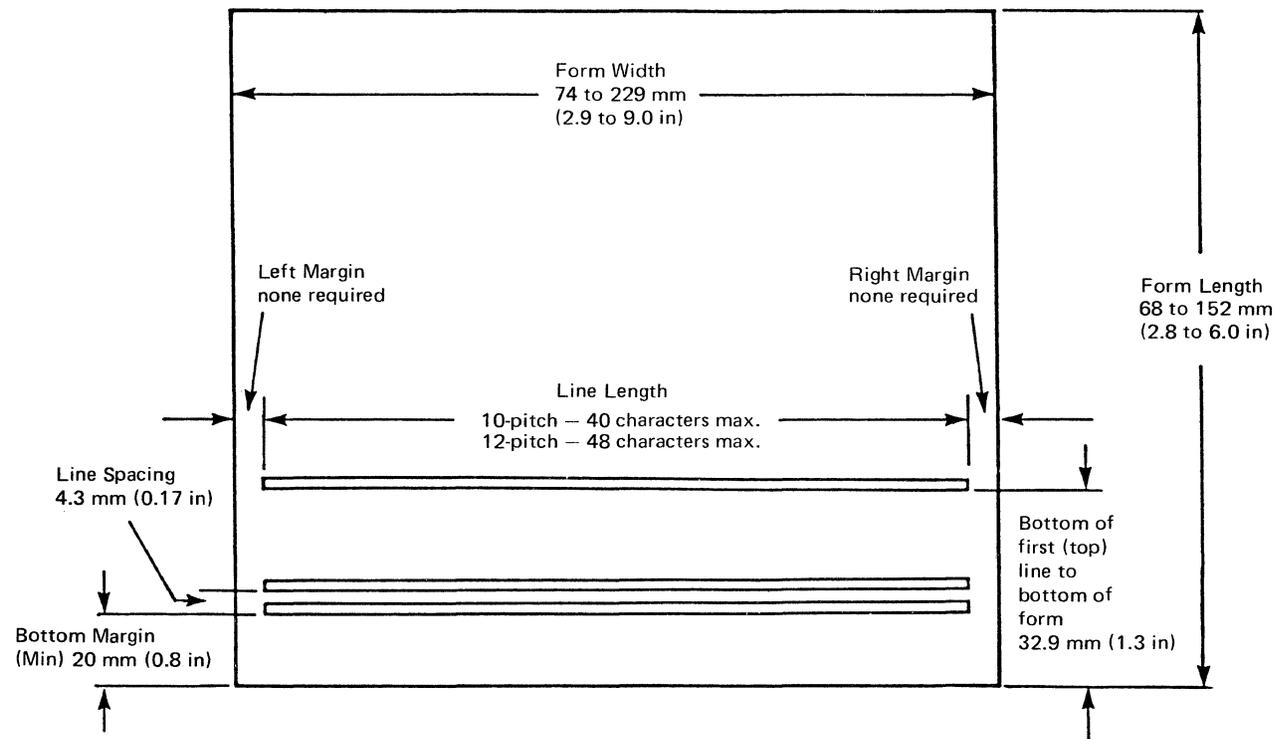


## Appendix F. Supplies and Specifications

### | Form Specification Highlights for 4700 Printers

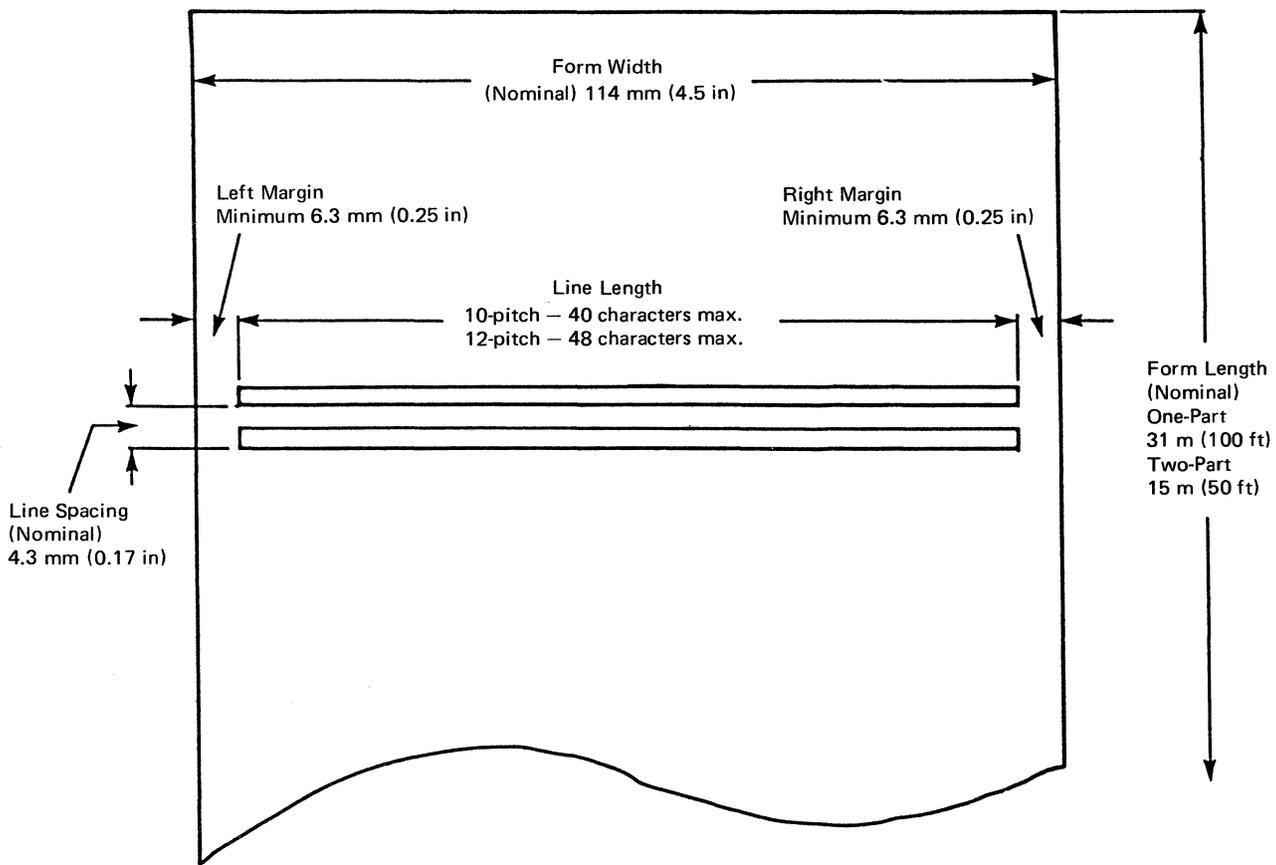
This section contains some of the general information for 4710 and 4720 printer form specifications. For detailed form specifications, see *Form Design Reference Guide For Printers, GA24-3488*.

#### 4710 Printer Forms



1. Form thickness is from 0.08 to 0.43 mm (0.003 to 0.017 in).
2. The maximum number of parts is three: one original plus two copies.
3. If one part is card stock, it must be the last part of the form set.
4. Multipart forms must be fastened at one edge.
5. Do not use forms that have metal fasteners, staples, or shingled bottom or side edges.

Figure F-1. 4710 Cut Forms (Receipt) Specifications



1. Form thickness:
  - One-Part - from 0.0812 to 0.0914 mm (0.0032 to 0.0036 in)
  - Two-Part - from 0.1625 to 0.1829 mm (0.0064 to 0.0072 in)
2. The maximum number of journal parts is two.
3. When cut forms are placed in front of the journal, the maximum combined thickness of the cut forms and journal parts cannot exceed 0.432 mm (0.017 in).

**Figure F-2. 4710 Journal Specifications**

## 4720 Printer Forms

The 4720 printers can print on a variety of documents. This section provides requirements, restrictions, recommendations, dimensions, and parameters for each form.

### Cut Form

**Note:** Before ordering large quantities of cut forms, you should test them for print quality and printer processing.

#### *Paper-weight restrictions*

- *Single-part cut forms:* between 45-g/m<sup>2</sup> (12-lb) bond to 161-g/m<sup>2</sup> (99-lb) tab card stock
- *Single sheets of multipart cut forms:* between 45-g/m<sup>2</sup> (12-lb) bond to 161-g/m<sup>2</sup> (99-lb) tab card stock
- *Envelopes:* between 56-g/m<sup>2</sup> (15-lb) bond to 90-g/m<sup>2</sup> (24-lb).

You should review and apply the following requirements and recommendations. Operating outside these limits could cause unsatisfactory results.

#### *Thickness requirements*

1. *Single-part:*
  - 0.10 mm (0.004 in) minimum
  - 0.28 mm (0.011 in) maximum
2. *Multipart:*
  - a. Thickness for individual sheets
    - Last part
      - 0.07 mm (0.0029 in) minimum
      - 0.18 mm (0.007 in) maximum
    - Other parts
      - 0.07 mm (0.0029 in) minimum
      - 0.11 mm (0.0045 in) maximum
  - b. Total thickness
    - 0.15 mm (0.006 in) minimum
    - 0.432 mm (0.017 in) maximum

The multipart thickness requirements apply to any combination of cut forms and journals. The multipart combinations are:

- Four-part cut forms with no journal
- Three-part cut forms with a one-part journal
- Two-part cut forms with a two-part journal.

#### 3. *Envelopes:*

- (Envelopes not assembled) paper thickness:
  - 0.07 mm (0.0029 in) minimum
  - 0.14 mm (0.0055 in) maximum
- (Assembled envelope) paper thickness:
  - Joints—0.4 mm (0.016 in) maximum
  - Joints + Flap—0.55 mm (0.022 in) maximum

**Other Requirements and Recommendations**

1. To get maximum print contrast, you must use paper that is white or light colored.
2. All forms must be flat and the top and left edges must be square (within 0.1°).
3. Using card-stock cut forms with journals can cause unsatisfactory journal-print legibility.

**Card Stock Cut-Form Definition:**

- Thickness for single-part cut forms:  
0.14 mm (0.0055 in) minimum  
0.28 mm (0.011 in) maximum
- Thickness for sheets within multipart cut forms:  
0.11 mm (0.0045 in) minimum  
0.18 mm (0.007 in) maximum

If you decide to use a card-stock cut form in a multipart form, ensure that the card-stock cut form is the last part. If you do not, unsatisfactory print legibility will result on subsequent parts.

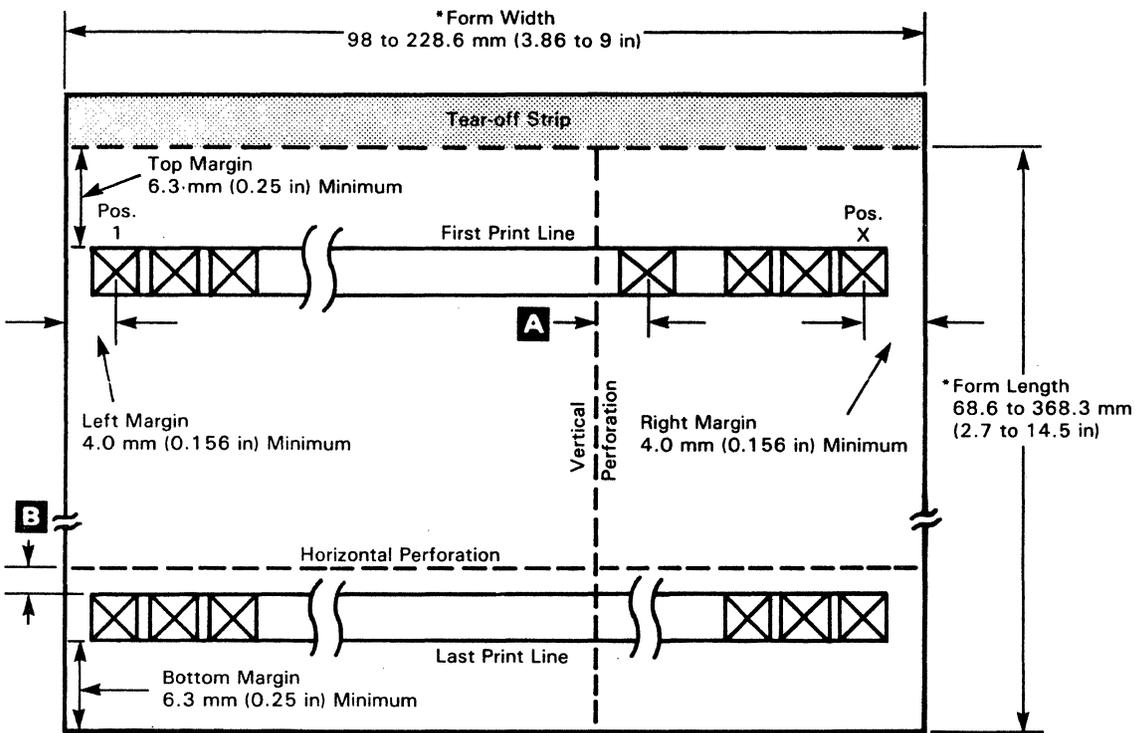
4. Cut-form opacity must be at least 75%. Cut forms with less than 75% opacity may cause document-feed errors.
5. Do not print on the cut-form tear-off strips (this is the perforated strip at the top of a multipart cut form).
6. Do not use *quality print* on envelopes; this could damage the printer.
7. Printing over the glued joints of envelopes can slightly reduce print legibility. This is due to thickness variations.
8. When designing preprinted cut forms with spaces (in which you plan to print characters), you must account for line-space and character-space variations. To do this, ensure that the space(s) is within  $\pm 1/2$  a character of the nominal space-position(s).

**Other restrictions:** Do not use:

- Forms that have warps, folds, tears, or bent corners
- Forms that have perforations or foreign materials in the print area
- Forms with glued-bottom-edges, or shingled or stapled edges.

**Warning:** The following fastenings could cause damage to the printer.

- Forms with metal, hard plastic, or staple fastening
- Forms that have spot carbon.



\* For printing envelopes:  
 Width is 241.3 mm (9.5 in) maximum.  
 Length is 114.4 mm (4.5 in) maximum.

Printing is allowed within:

- **A** 3.9 mm (0.156 in) of a vertical perforation
- **B** 6.25 mm (0.25 in) of a horizontal perforation

Figure F-3. 4720 Cut Form Dimensions and Parameters

## Passbooks

**Note:** Before ordering large quantities of passbooks, you should test them for print quality and printer processing.

The 4720 Printer Models 3 and 4 can print on a variety of passbooks with a vertical or horizontal fold.

To get acceptable page quality and maximum print contrast, you must use paper that weighs between 75 and 120 g/m<sup>2</sup> (20 to 32 lb), with a calendar finish on both sides, and white or light in color.

You should review and apply the following requirements and recommendations. Operating outside these limits could cause unsatisfactory results.

### ***Thickness requirements***

1. *Basic passbooks*, while open:
  - 0.28 mm (0.011 in) minimum
  - 1.12 mm (0.044 in) maximum (horizontal-fold passbooks).
  - 1.27 mm (0.05 in) maximum (vertical-fold passbooks).
  - The maximum difference between both sides of an open passbook is 0.84 mm (0.033 in).
2. *Single-page passbooks, or ledger cards*:
  - 0.18 mm (0.007 in) minimum
  - 0.28 mm (0.011 in) maximum.
3. *Covers*:
  - 0.18 mm (0.007 in) minimum
  - 0.46 mm (0.018 in) maximum.
4. *Magnetic Stripe*:
  - Equal to or less than 0.13 mm (0.005 in)
  - Ensure that you follow the attachment instructions.

**Note:** Printing on pages --directly over the magnetic stripe-- will reduce print legibility.

### ***Other requirements and recommendations***

1. Passbook covers must be compatible with the feed roller mechanism.  
For example:

Covers that have soft-plastic coatings or foreign materials on them could cause unsatisfactory print legibility and/or handling problems.

2. Temperature and humidity (other than ambient), ribbon age, passbook thickness, cover stiffness, and the definition of the fold are all factors that can cause light printing within the following areas of passbooks:
  - **Horizontal Fold:** 6.35 mm (0.25 in) to 8.89 mm (0.35 in) of the fold
  - **Vertical Fold:** 7.87 mm (0.31 in) to 9.65 mm (0.38 in) of the fold.

3. To obtain optimum printer performance, you should use passbooks that meet the following aspect-ratio considerations:

The aspect ratio should be within the following range:

**1.2 to 1 -through- 2.5 to 1**

To obtain your aspect ratio, perform the following calculation using the dimensions of a *closed* passbook:

$$\begin{array}{l} \text{Dimensions} \\ \text{parallel to} \\ \text{the fold} \end{array} \div \begin{array}{l} \text{Dimensions} \\ \text{perpendicular} \\ \text{to the fold} \end{array} = \text{Aspect Ratio}$$

If your passbook aspect-ratio is outside this range, test some of your passbooks in the printer to ensure satisfactory printing.

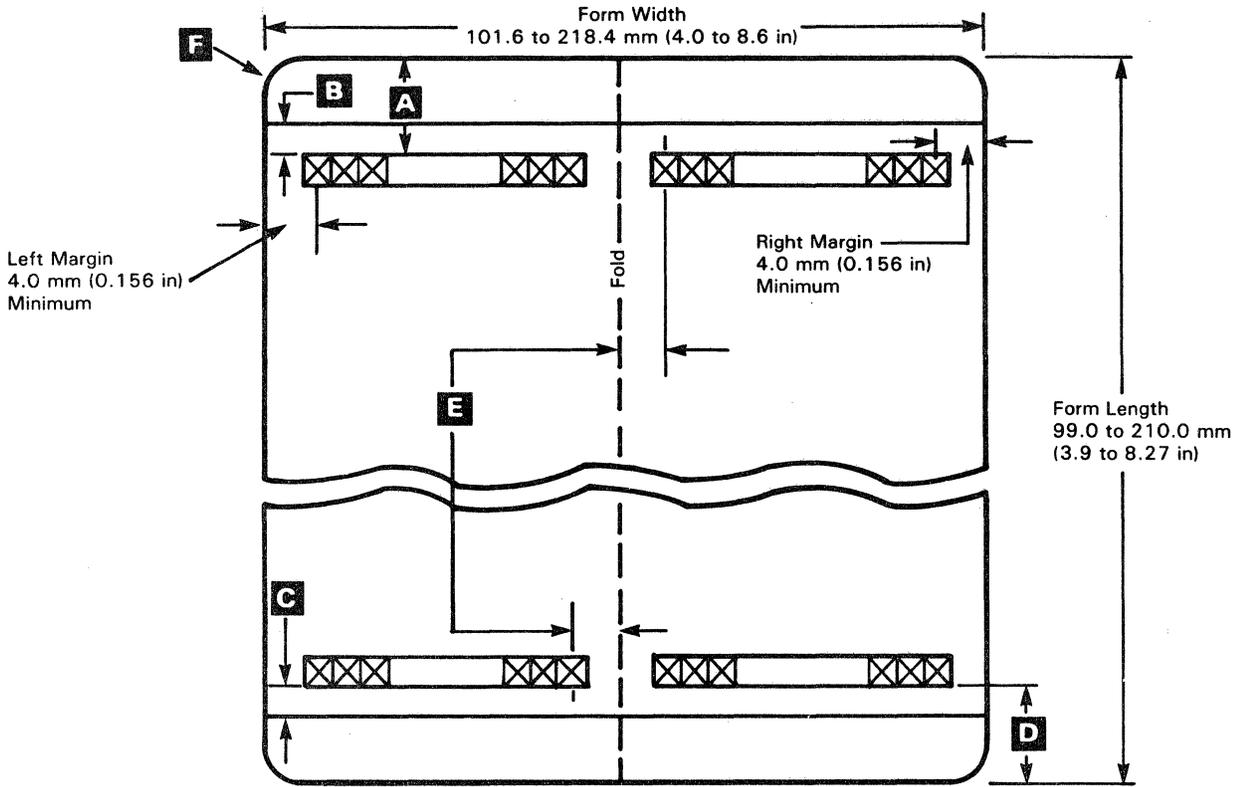
4. To ensure optimum printer-handling and minimum printer-rejects for passbooks:
- Ensure that all edges are square (within 0.1°) and
  - (For vertical-fold passbooks) ensure that the passbook-pages are shorter than the top edge of the cover.
5. When designing your applications, ensure that the print lines are parallel to the center fold.
6. The stiffness and hardness of the cover should be close to tab-card stock (minimum is V5 Number 8).
7. Windows/cutouts in the cover should not cause the cover to bend or become weak.
8. The cover and page folds must be even. Page folds and stitching must coincide with the cover fold.
9. Passbook stitching should be 6 to 10 stitches per inch.

**Other restrictions:** Do not use passbooks that have:

- Holes, cut-outs, or perforations in the print area.
- Covers that are not uniform in thickness in the print area.
- Folds, tears, or foreign material on the pages or covers (the exception is properly-applied magnetic stripes).
- Notches on the sides or top edges of the covers.

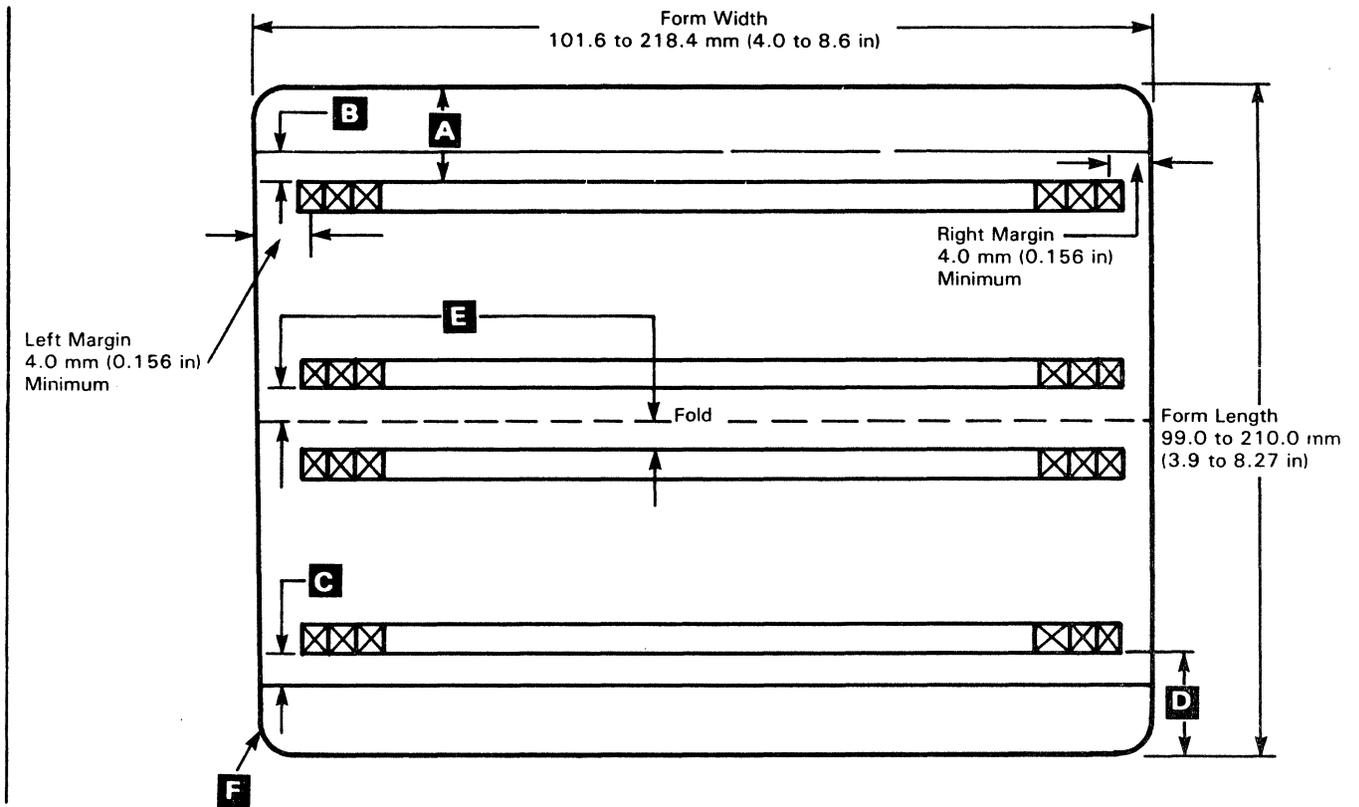
**Warning:** The following fastenings could cause damage to the printer.

- Metal, hard plastic or staple fasteners, or stick-ons of any type.



- **A** Top Margin: 6.4 mm (0.256 in) minimum.
- **B** Distance from the top of the short page to the top of a character block on the first print line: 6.4 mm (0.256 in) minimum.
- **C** Distance from the bottom of the short page to the bottom of a character block on the last print line: 6.4 mm (0.256 in) minimum.
- **D** Bottom Margin: 6.4 mm (0.256 in) minimum.
- **E** To ensure clear printing, the distance from the center of a character block to the center fold is 7.87 mm (0.31 in) minimum. Additional information is under "Other requirements and recommendations."
- **F** Rounded corner radius: 3.18 to 9.53 mm (0.127 to 0.38 in).

Figure F-4. 4720 Vertical-Fold-Passbook Dimensions and Parameters



- **A** Top Margin: 6.4 mm (0.256 in) minimum.
- **B** Distance from the top of the short page to the top of a character block on the first print line: 6.4 mm (0.256 in) minimum.
- **C** Distance from the bottom of the short page to the bottom of a character block on the last print line: 6.4 mm (0.256 in) minimum.
- **D** Bottom Margin: 6.4 mm (0.256 in) minimum.
- **E** To ensure clear printing, the distance from the center of a character block to the center fold is 6.35 mm (0.25 in) minimum. Additional information is under "Other requirements and recommendations."
- **F** Rounded corner radius: 3.18 to 9.53 mm (0.127 to 0.38 in).

Figure F-5. 4720 Horizontal-Fold-Passbook Dimensions and Parameters

## Journal

The 4720 Printer Models 2 and 4 have a journal that records all transactions. The journal is behind the print station. The journal can be one- or two-part ink impregnated carbonless paper, with a paper weight of 38 g/m<sup>2</sup> to 45 g/m<sup>2</sup> (10 to 12 lb).

### *Requirements and recommendations*

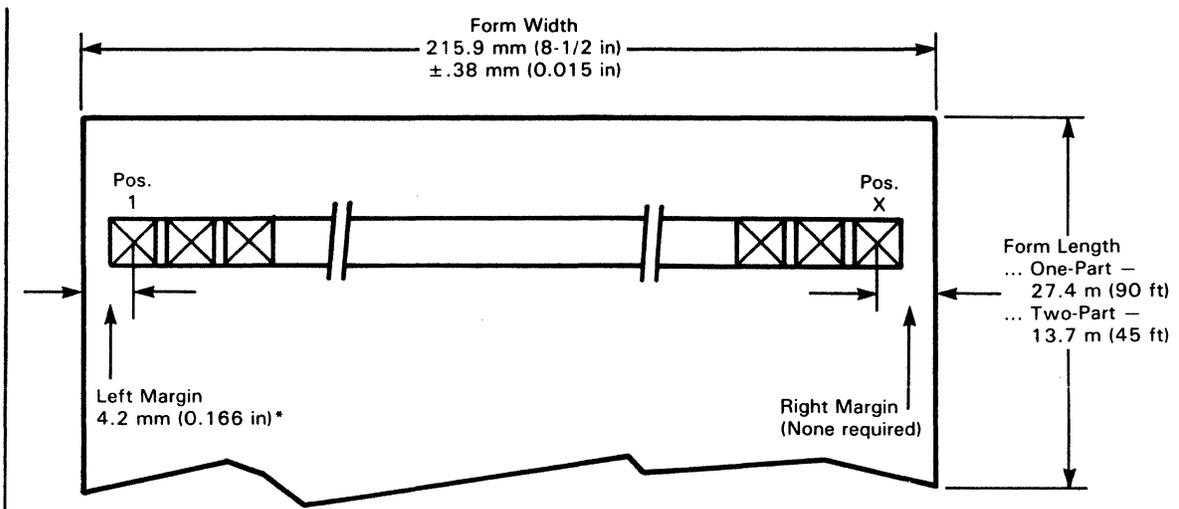
- The print will not come through onto the journal if (during multipart printing) the combined thickness of the journal and cut forms or passbook is more than 0.432 mm (0.017 in).

If you use thick cut forms or passbooks, ensure that your application program causes the printer to print on the journal after the cut form or passbook leaves the print station.

- Maximum journal roll diameter is 60 mm (2.36 in).
- The inside diameter of the journal-roll core must be 11.4 mm (0.45 in) ± 0.13 mm (0.005 in).
- Use plastic cores for journal rolls.
- Take-up roll capacity:
  - 27.4 m (90 ft) for one-part rolls.
  - 13.7 m (45 ft) for two-part rolls.
- The end of the journal must not be attached to the core.
- On the last 900 mm to 1200 mm (3 ft to 4 ft) of the roll, the journal paper should have a red strip on its edge to show that you are near the end of the roll.
- When printing onto a journal form (from the right vertical edge of a cut form) you should print at least 4.4 mm (0.175 in) from the right vertical edge of the cut form.

### *Other restrictions:* Do not use:

- Cardboard cores for journal rolls
- Bond paper for journals
- Preprinted journals
- Journals that have perforations.



\* While printing, the print can vary  $\pm 2.95$  mm (0.118 in).

Figure F-6. 4720 Journal Dimensions and Parameters

### Ordering Supplies and Accessories

You should order all supplies and accessories for the equipment at least 60 days before installation. They can be ordered through your IBM marketing representative or by IBM Direct Sales. The supplies for the specified device are identified below:

#### *For 4710 Receipt/Validation Printer*

Item	Part Number	Quantity Per Package
Two-part journal paper	7032919	48 rolls
Single-part journal paper	7032894	48 rolls
Black cartridge ribbon	7037985	5
Purple cartridge ribbon	7033537	5

#### *For 4720 Printers*

Item	Part Number	Quantity Per Package
Two-part journal paper	457365	24 rolls
Single-part journal paper	457363	24 rolls
Purple cartridge ribbon	7032757	Box of 10
Print Head	7034533	1

**For 4701 Controller**

Item	Part Number	Quantity Per Package
Diskette I	2305845	10
Diskette II	2736700	10
Diskette 2D	1766872	10

**Magnetic Stripe Specifications for Passbooks**

The 4700 magnetic stripe devices (magnetic stripe reader and magnetic stripe reader/encoder) read credit cards and other plastic cards that have been encoded on Track 2 at 75 bpi as defined in the ANSI standard X4.16-1976.

The magnetic stripe reader/encoder also reads and encodes magnetic stripes on passbooks in the same relative position as Track 2 of a credit card. Figure F-7 shows the minimum size of the magnetic stripe and where it must be placed relative to the edge of the passbook.

The performance characteristics of the magnetic stripes must be in accordance with ANSI X 4.16 (1976).

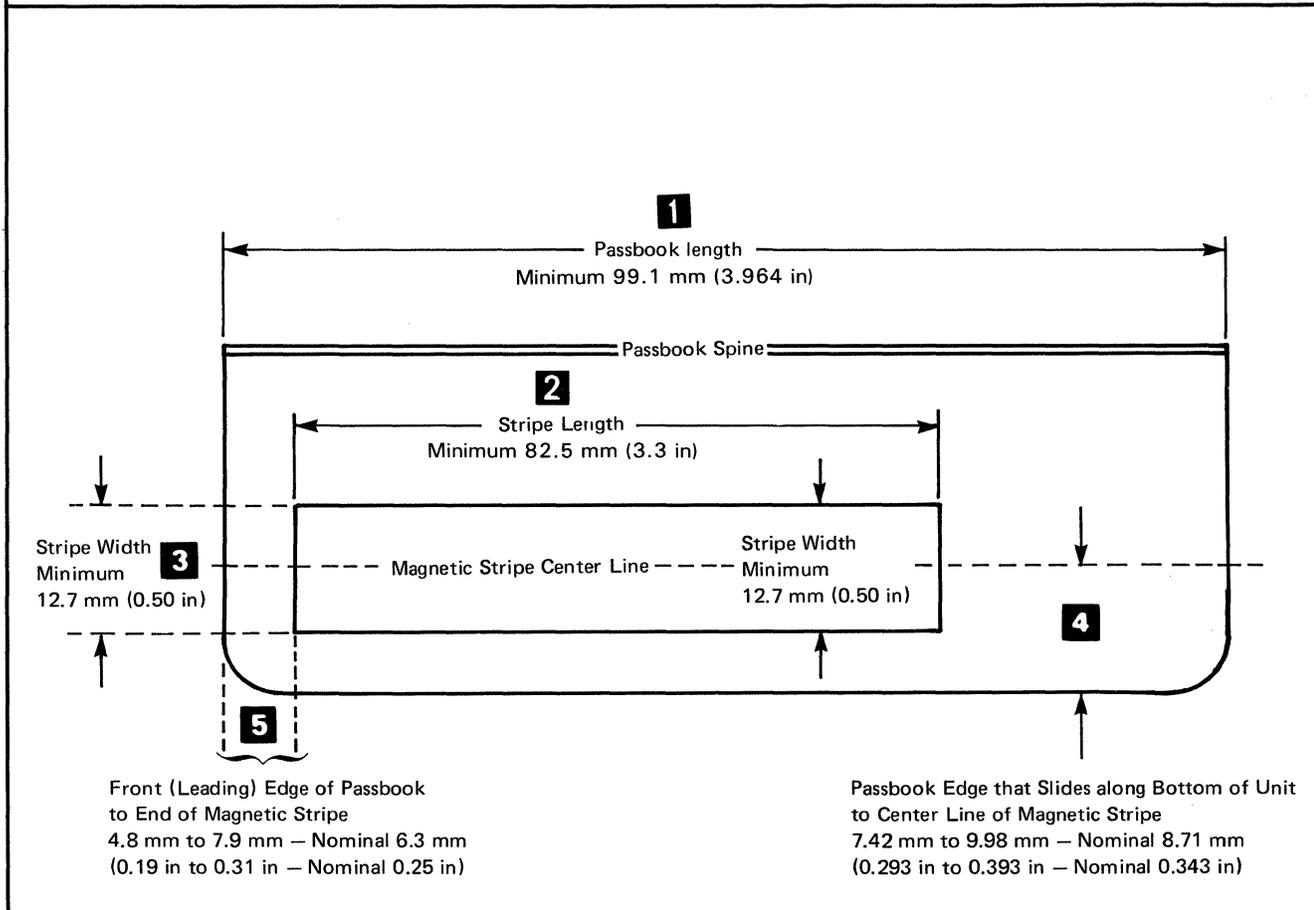
The basic understanding is that most credit cards use "Low Coercivity" stripes, in the range of 300 oersteds. IBM passbooks stripes are specified  $290 \pm 45$  oersteds.

Magnetic stripes on adhesive-backed labels are available from IBM. You must use these magnetic stripes (IBM part number 428650) or their equivalent.

Dimension	Maximum	Minimum	Nominal
1 Passbook length		99.1 mm (3.964 in)	
2 Stripe length		82.5 mm (3.3 in)	
3 Stripe width		12.7 mm (0.50 in)	
4 See Note 1	9.98 mm (0.393 in)	7.42 mm (0.293 in)	8.71 mm (0.343 in)
5 See Note 2	7.9 mm (0.31 in)	4.8 mm (0.19 in)	6.3 mm (0.25 in)
Form thickness. See Note 3	0.85 mm (0.033 in)	0.25 mm (0.010 in)	

**Notes:**

1. Dimension 4 is the distance from the center line of the magnetic stripe to the edge of the passbook that slides along the bottom of the unit.
2. Dimension 5 is the distance from the end of magnetic stripe to the front edge (leading edge) of the passbook.
3. The minimum dimension excludes the thickness of the stripe itself (that is, the form must be at least this thick, regardless of how thin the stripe is); the maximum dimension includes the form and the stripe itself.



**Note:** Minimum form thickness – 0.25 mm (0.010 in) excluding thickness of stripe itself (that is, the form must be at least this thick, regardless of the thickness of the stripe).  
Maximum form thickness including the stripe – 0.85 mm (0.033 in).

**Figure F-7. Passbook Specifications**

## Appendix G. Loop Installation Checks

### Tools and Parts Needed to Check Your Loop

You need these tools to check your loop:

- Volt-OHM meter
- Meter Probe Tips
- Two pair of Test Jacks and Plugs

The Volt-OHM meter is a standard measuring tool. Follow the basic operating and adjustment guidelines to obtain the readings specified in the procedures. The test jack and plug is a special loop tool, see Figure G-1.

A test plug and jack can be cut from preassembled cable or made with two-conductor bulk cable and right-angle connectors. Each wire that comes out of the test connectors should have an alligator clip attached as shown below. If you make your own test connectors, you must wire the plug and jack connector as shown in Figure 5-13 on page 5-28.

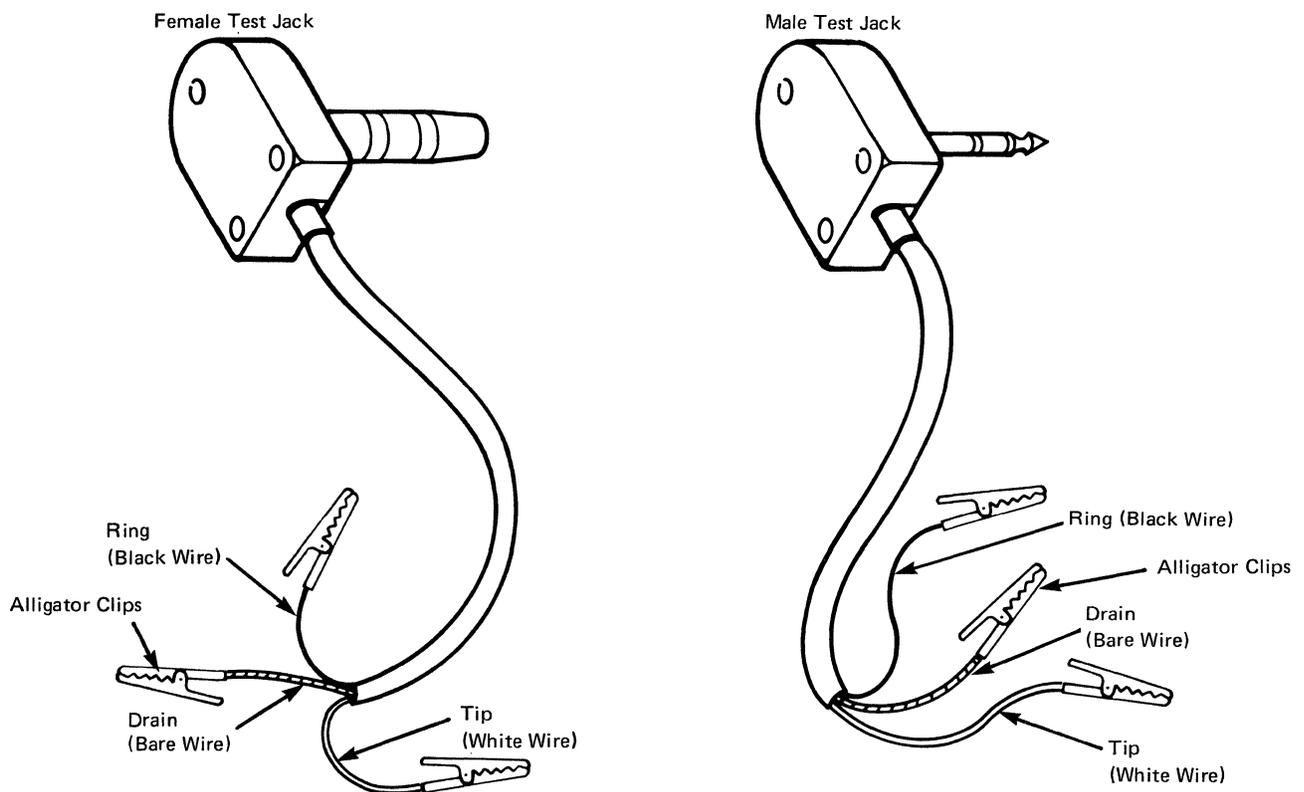


Figure G-1. Test Jack and Plug Used When Checking Loops

## **| Loop Checks (Before Installation)**

The following checks are contained in the section:

- “Checking Preassembled Cables "a" or "g"” on page G-3
- “Checking Preassembled Cable "f"” on page G-4
- “Checking Bulk Cable "a", "g", or "i"” on page G-6
- “Checking Bulk Cable "f"” on page G-7
- “Checking Wall-Plate Assemblies” on page G-8.

### **| Prerequisite for Persons Performing These Procedures**

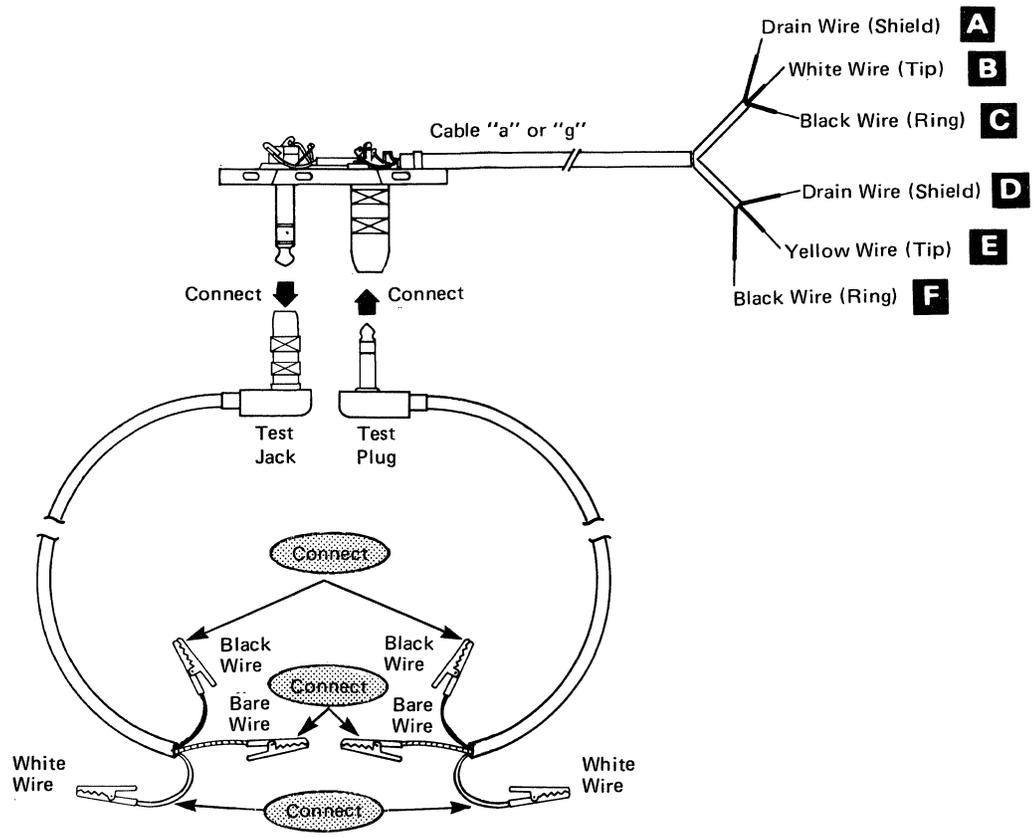
Ensure that the person performing these procedures can properly adjust and use the specified tools. This person should also understand basic resistance and voltage measuring practices.

## Checking Preassembled Cables "a" or "g"

This procedure describes the steps to check preassembled cables identified by cable keys "a" (IBM PN 1745348) and "g" (IBM PN 1745372). This is a four-conductor cable, consisting of two separate twisted pairs. You must check each twisted pair.

1. The objective is to ensure that no wires or connections are shorted.
2. The tools needed to do this procedure are (1) Volt-OHM meter and (2) Test Jack and plug. For a description of these tools, see "Tools and Parts Needed to Check Your Loop" on page G-1.
3. This procedure directs you to measure between points shown in the diagram below.
4. Connect the test jack and plug to the cable, connect the test jack and plug wires (as indicated), then measure the resistance between the indicated points:
  - a. **A** and **B** and between **D** and **E**  
 *Meter Reading = Infinity*
  - b. **A** and **C** and between **D** and **F**  
 *Meter Reading = Infinity*
  - c. **B** and **C** and between **E** and **F**  
 *Meter Reading = Infinity*

If you do not obtain the specified meter readings and you are sure that all wire connections are properly soldered, the cable is faulty.



## | **Checking Preassembled Cable "f"**

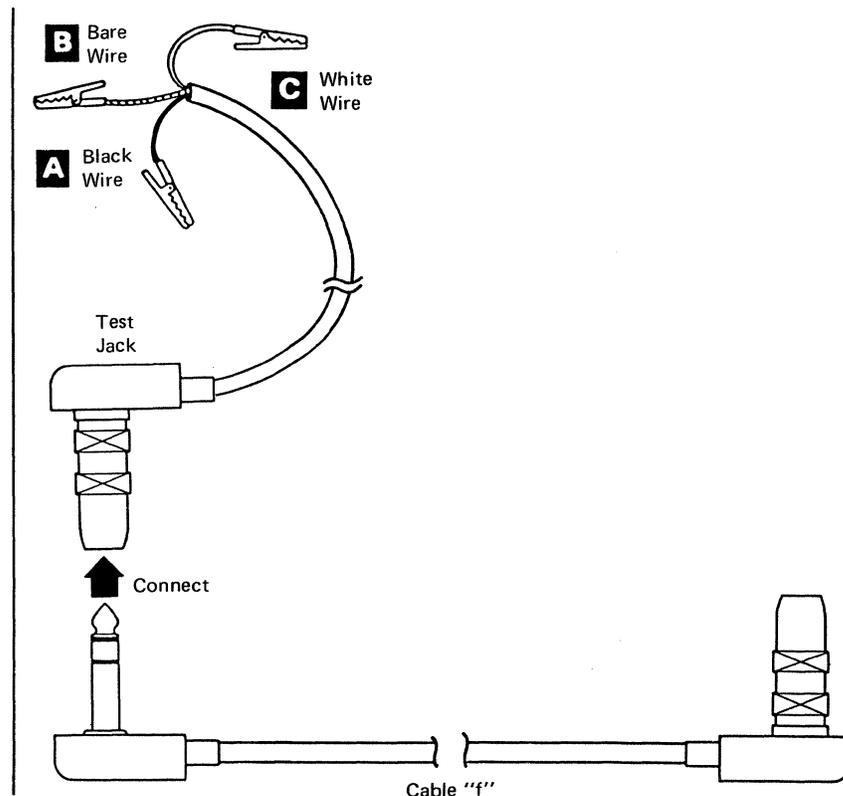
This procedure describes the steps to check preassembled cables identified by cable key "f" (IBM PN 1563155).

- The objective is to ensure that the cable has continuity and that no wires are shorted.
- The tools needed to do this procedure are (1) Volt-OHM meter and (2) Test Jack and plug. For a description of these tools, see "Tools and Parts Needed to Check Your Loop" on page G-1.

## | **Checking for Shorted Wires or Connections**

1. This procedure directs you to measure between points shown in the diagram below.
2. Connect the test jack to the plug of the cable (as shown), then measure the resistance between the following points:
  - a. **A** and **B**  
 *Meter Reading* = Infinity
  - b. **A** and **C**  
 *Meter Reading* = Infinity
  - c. **B** and **C**  
 *Meter Reading* = Infinity

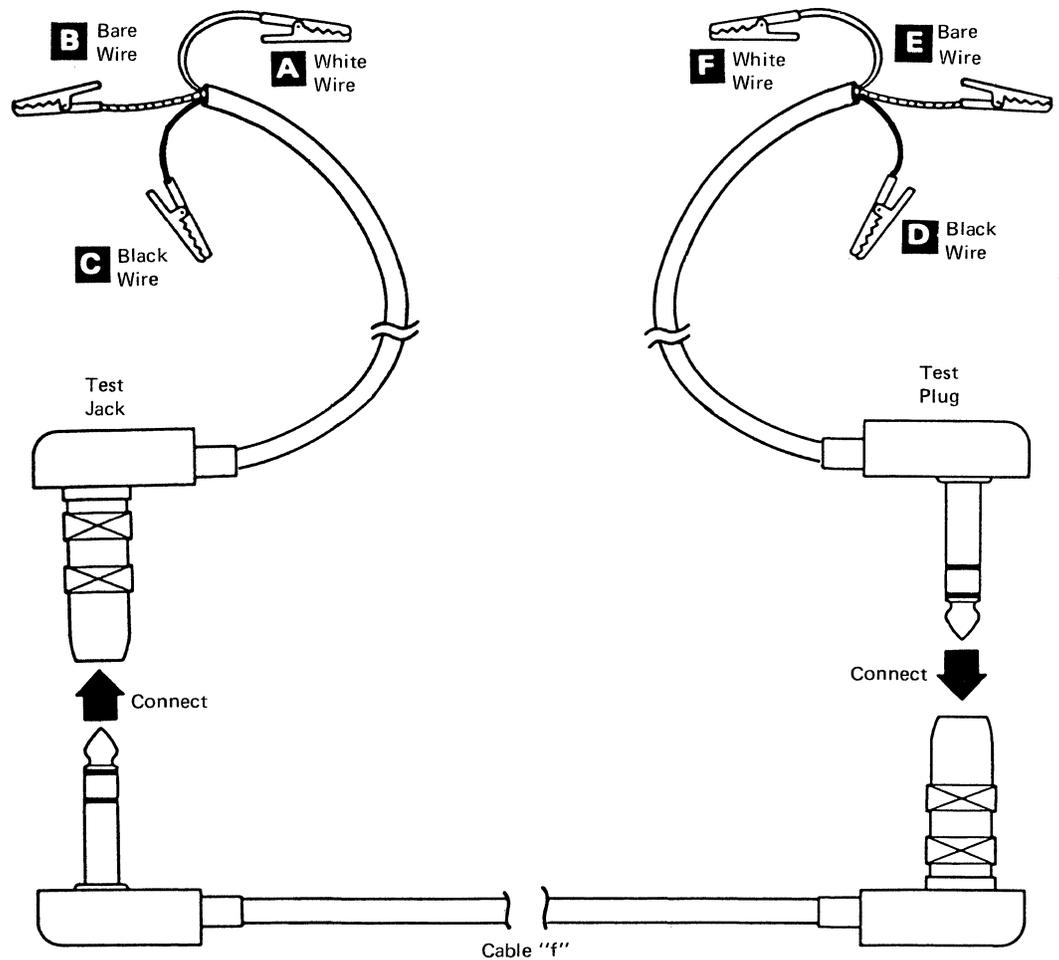
| If you do not obtain the specified meter readings and you are sure that all wire connections are properly soldered, the cable is faulty.



## | *Checking for Continuity*

1. This procedure directs you to measure between points shown in the diagram below.
2. Connect the test jack and plug to the cable (as shown), then measure the resistance between the following points:
  - a. **A** and **F**  
 *Meter Reading = Zero to 40 Ohms*
  - b. **B** and **E**  
 *Meter Reading = Zero to 40 Ohms*
  - c. **C** and **D**  
 *Meter Reading = Zero to 40 Ohms*

If you do not obtain the specified meter readings and you are sure that all wire connections are properly soldered, the cable is faulty.



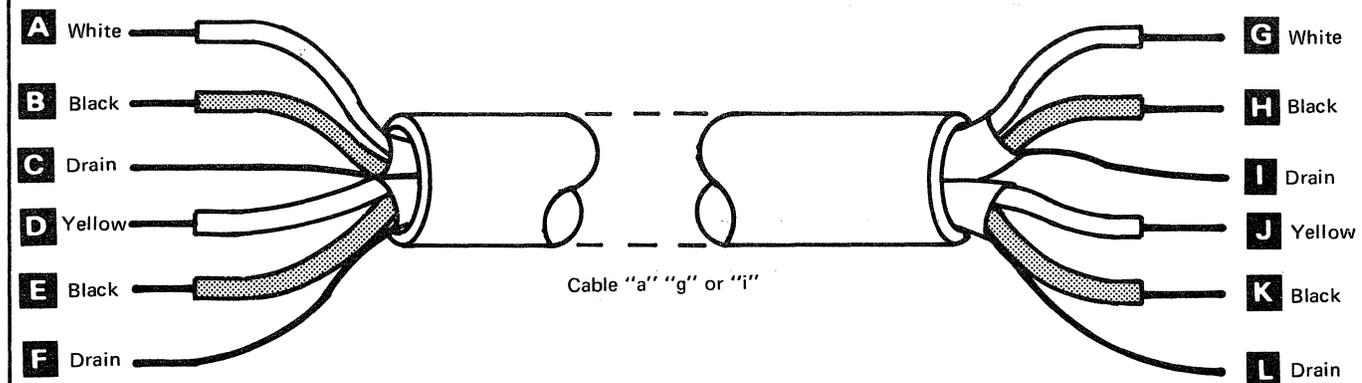
## Checking Bulk Cable "a", "g", or "i"

**Note:** Before doing this check, ensure that all cables have been cut to your specific segment length and properly dressed for connector attachment.

This procedure describes the steps to check the four-conductor bulk cables (IBM PN 5252913) identified by cable keys "a", "g", or "i". This four-conductor cable consists of two separate twisted pairs; you must check each twisted pair.

1. The objective is to check for continuity (ensure that no wires are broken).
2. The only tool needed is the Volt-OHM meter.
3. This procedure directs you to measure between points shown in the diagram below.
4. Measure the resistance between the following points:
  - a. **A** and **G**  
 Meter Reading = Zero to 40 Ohms
  - b. **B** and **H**  
 Meter Reading = Zero to 40 Ohms
  - c. **C** and **I**  
 Meter Reading = Zero to 40 Ohms
  - d. **D** and **J**  
 Meter Reading = Zero to 40 Ohms
  - e. **E** and **K**  
 Meter Reading = Zero to 40 Ohms
  - f. **F** and **L**  
 Meter Reading = Zero to 40 Ohms

If you do not obtain the specified meter readings, the cable is faulty.



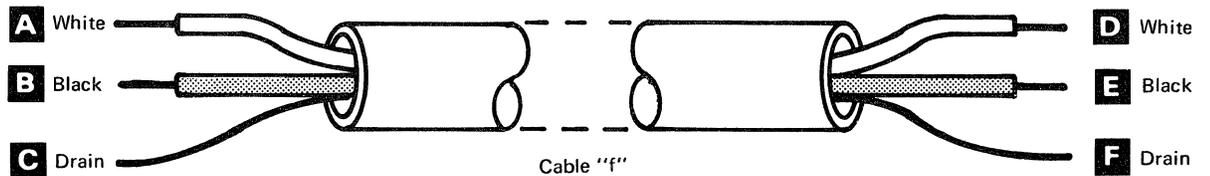
## | Checking Bulk Cable "f"

**Note:** Before doing this check, ensure that all cables have been cut to your specific segment length and properly dressed for connector attachment.

This procedure describes the steps to check bulk cables identified by cable key "f" (IBM PN 5252769 and PN 5252920).

1. The objective is to check for continuity (ensure that no wires are broken).
2. The only tool needed is the Volt-OHM meter.
3. This procedure directs you to measure between points shown in the diagram below.
4. Measure the resistance between the following points:
  - a. **A** and **D**  
 *Meter Reading = Zero to 40 Ohms*
  - b. **B** and **E**  
 *Meter Reading = Zero to 40 Ohms*
  - c. **C** and **F**  
 *Meter Reading = Zero to 40 Ohms*

If you do not obtain the specified meter readings, the cable is faulty.

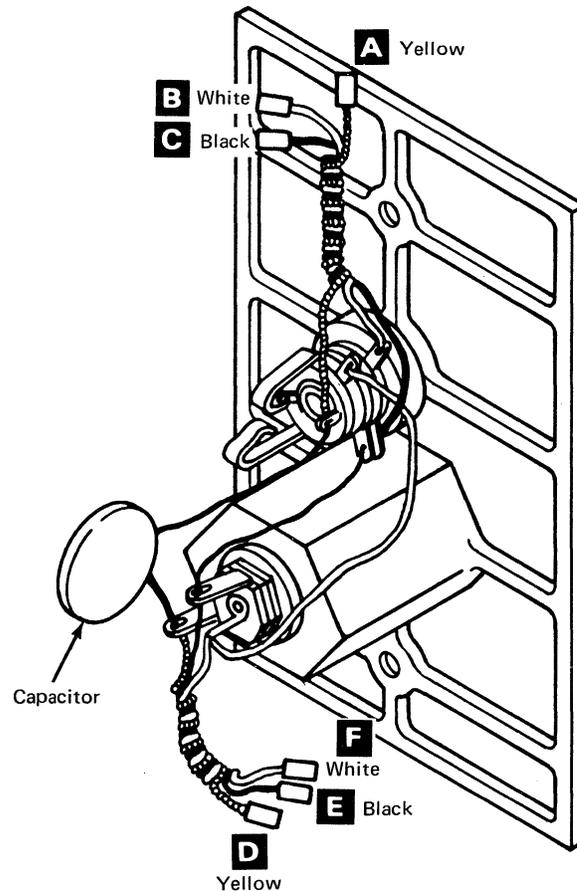


## | Checking Wall-Plate Assemblies

This procedure describes the steps to check wall-plate assemblies (IBM PN 5929886).

1. The objective is to check for continuity (ensure that no wires or connections are broken).
2. The tools needed are the (1)Volt-OHM meter and (2)meter probes.
3. This procedure directs you to measure between points shown in the diagram below.
4. Measure the resistance between the following points:
  - a. **A** and **D**  
 *Meter Reading* = Infinity
  - b. **B** and **F**  
 *Meter Reading* = Zero to 40 Ohms
  - c. **C** and **E**  
 *Meter Reading* = Zero to 40 Ohms

If you do not obtain the specified meter readings and you are sure that all wire connections are properly soldered, the wall-plate is faulty.



## | Loop Checks (After Installation)

**Note:** Ensure that the person performing these procedures can properly adjust and use the specified tools. This person should also understand basic resistance and voltage measuring practices.

After you have installed your loop, check the loop to ensure you do not have the following types of faults:

- Broken connections between conductors or shields
- Shorts, which are connections between conductors of the same pair
- Grounding of individual conductors (either between a conductor and shield or between a conductor and some grounded object).

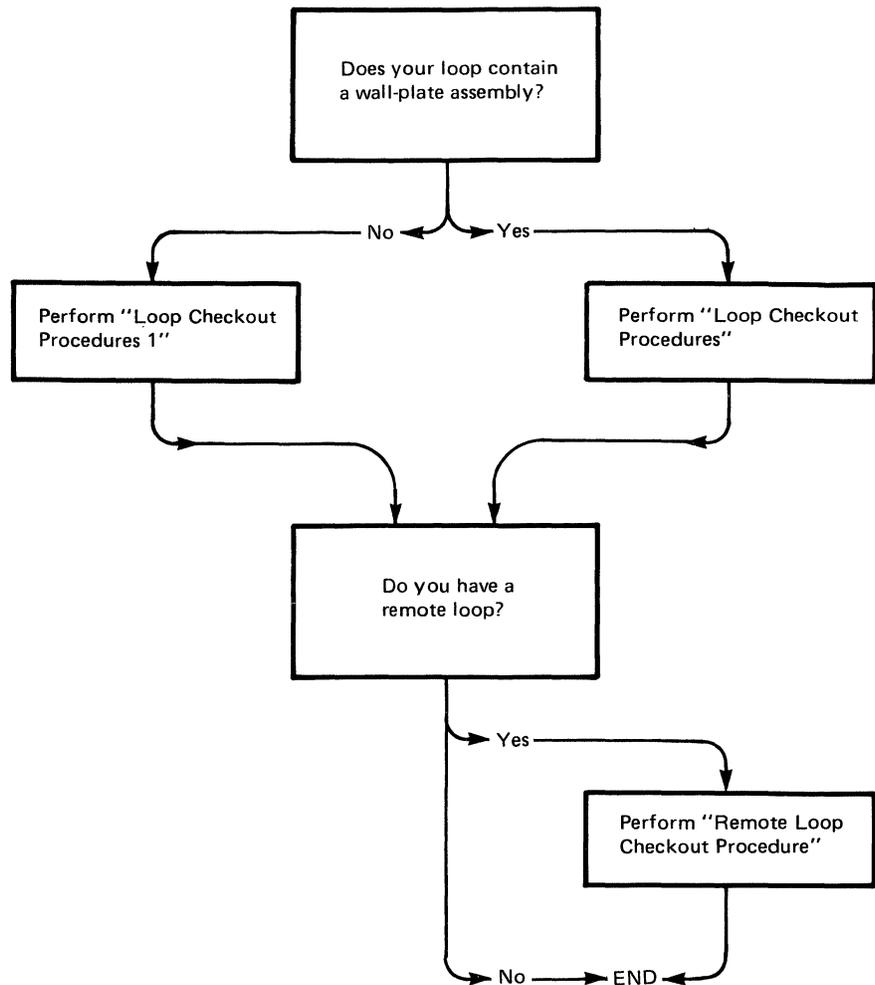


Figure G-2. Loop Checks Diagram (After Installation)

## | *Loop Checkout Procedures 1*

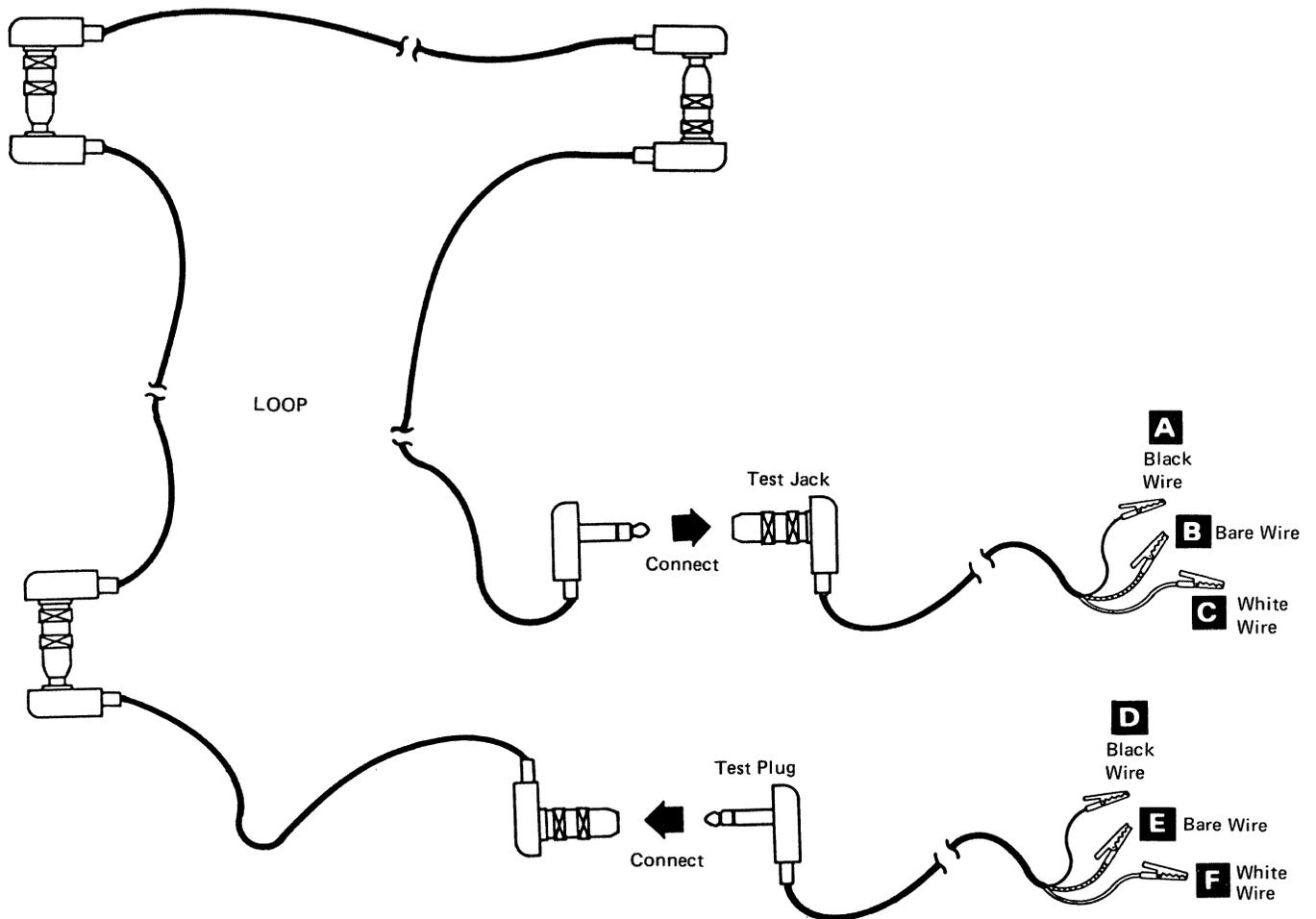
These procedures provide the steps to check a loop built with two-conductor cable (identified by cable key "f") and right-angle connectors. Each procedure directs you to measure between points shown in the diagram associated with its title. Review the following information.

- The tools needed are the (1)Volt-OHM meter and (2)test jack and plugs. For a description of these tools, see "Tools And Parts Needed To Check Your Loop" on page G-1.
- If you discover a problem while performing any of these procedures, and you have performed some action to fix the problem, you should start again at the first procedure in this section.

## Checking for Continuity

At a jack and plug connection point, connect the test jack and plug, then measure the resistance between the following points:

1. **A** and **D**  *Meter Reading = Zero to 40 Ohms*
2. **B** and **E**  *Meter Reading = Zero to 40 Ohms*
3. **C** and **F**  *Meter Reading = Zero to 40 Ohms*



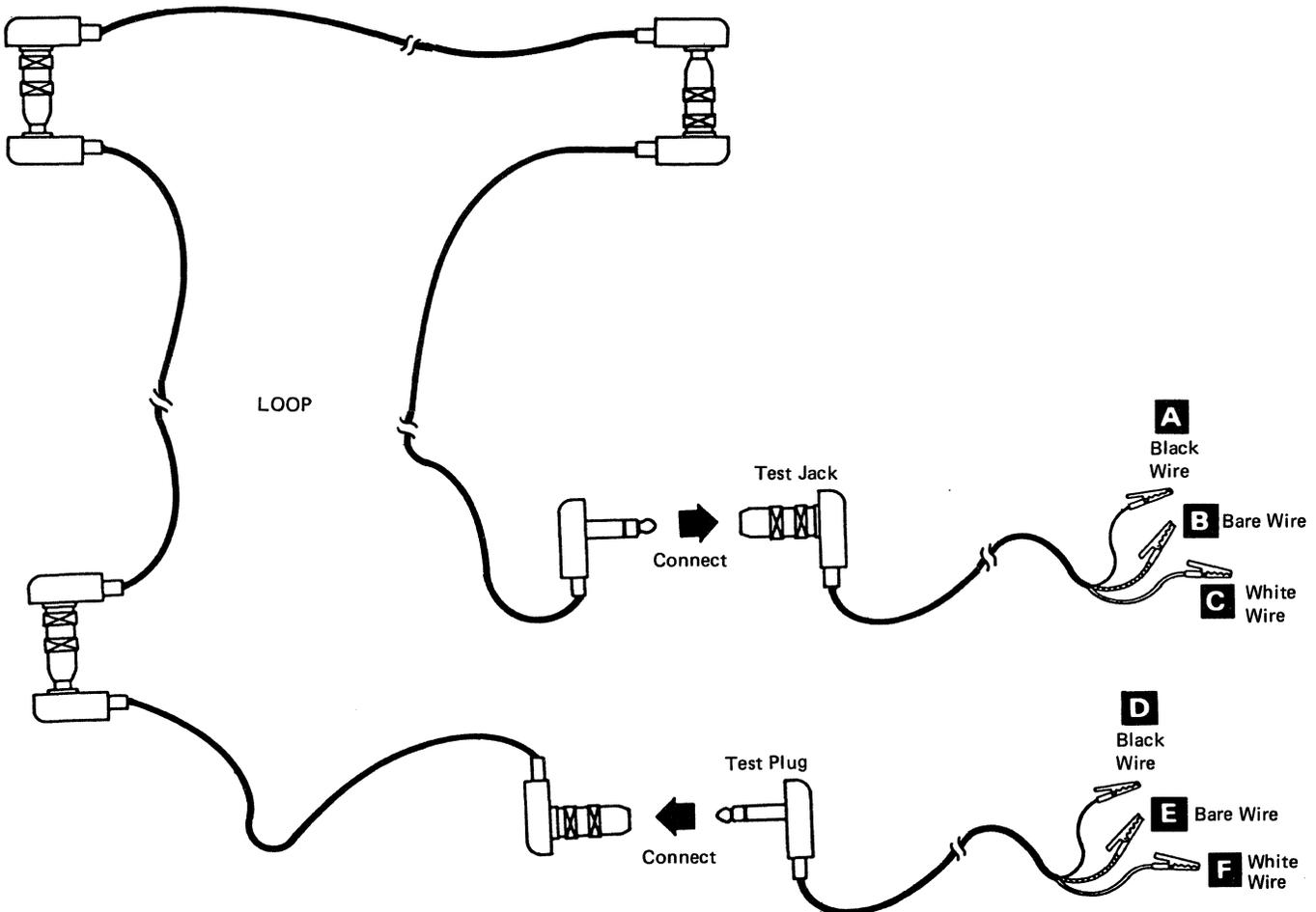
If you do not obtain the specified meter readings, check each segment of cable using the procedure: "Checking Preassembled Cable "f"" on page G-4. This will identify the faulty segment.

## Checking for Grounding

At a jack and plug connection point, connect the test jack and plug, then measure the resistance between the following points:

1. **A** and building ground  *Meter Reading = Infinity*
2. **B** and building ground  *Meter Reading = Infinity*
3. **C** and building ground  *Meter Reading = Infinity*
4. **D** and building ground  *Meter Reading = Infinity*
5. **E** and building ground  *Meter Reading = Infinity*
6. **F** and building ground  *Meter Reading = Infinity*

**Note:** An example of a building ground is the screw usually found on the basic electrical outlet.



If you do not obtain the specified meter readings, check each segment of cable using the procedure: "Checking Preassembled Cable "f"" on page G-4. This will identify the faulty segment.

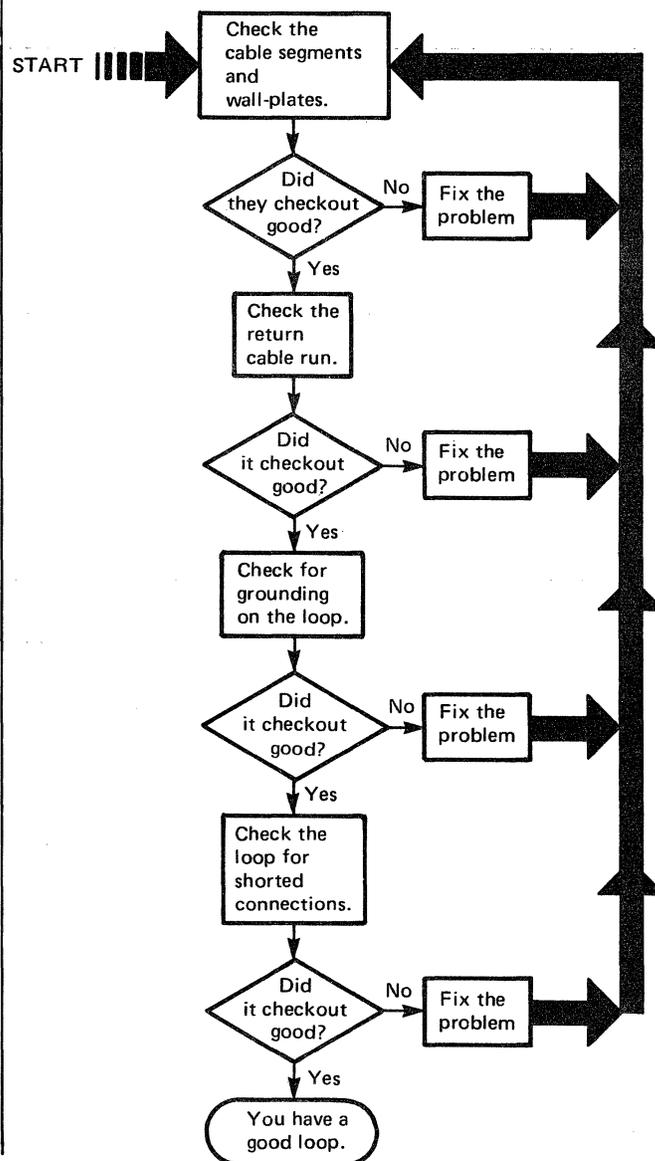


## | Loop Checkout Procedures 2

These procedures provide the steps to check a loop built with one or more wall-plate connectors. Each procedure directs you to measure between points shown in the diagram associated with its title. Review the following information:

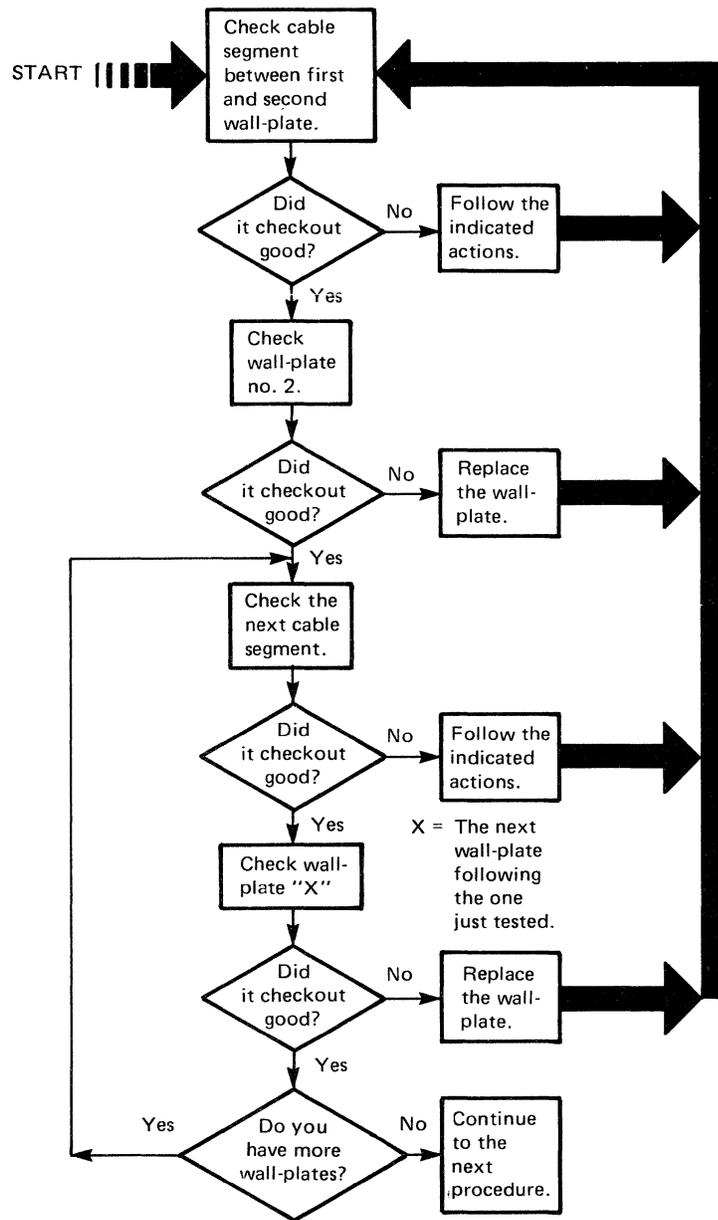
- The tools needed are the (1) Volt Ohmmeter and (2) two sets of test jacks and plugs. For a description of these tools, see "Tools and Parts Needed to Check Your Loop" on page G-1.
- If your loop contains any right-angle connectors, you must ensure that they are connected together. The result is a continuous loop.
- If you discover a problem while performing any of these procedures, and you have performed some action to fix the problem, you should start again at the first procedure in this section.

The following chart illustrates the testing sequence:



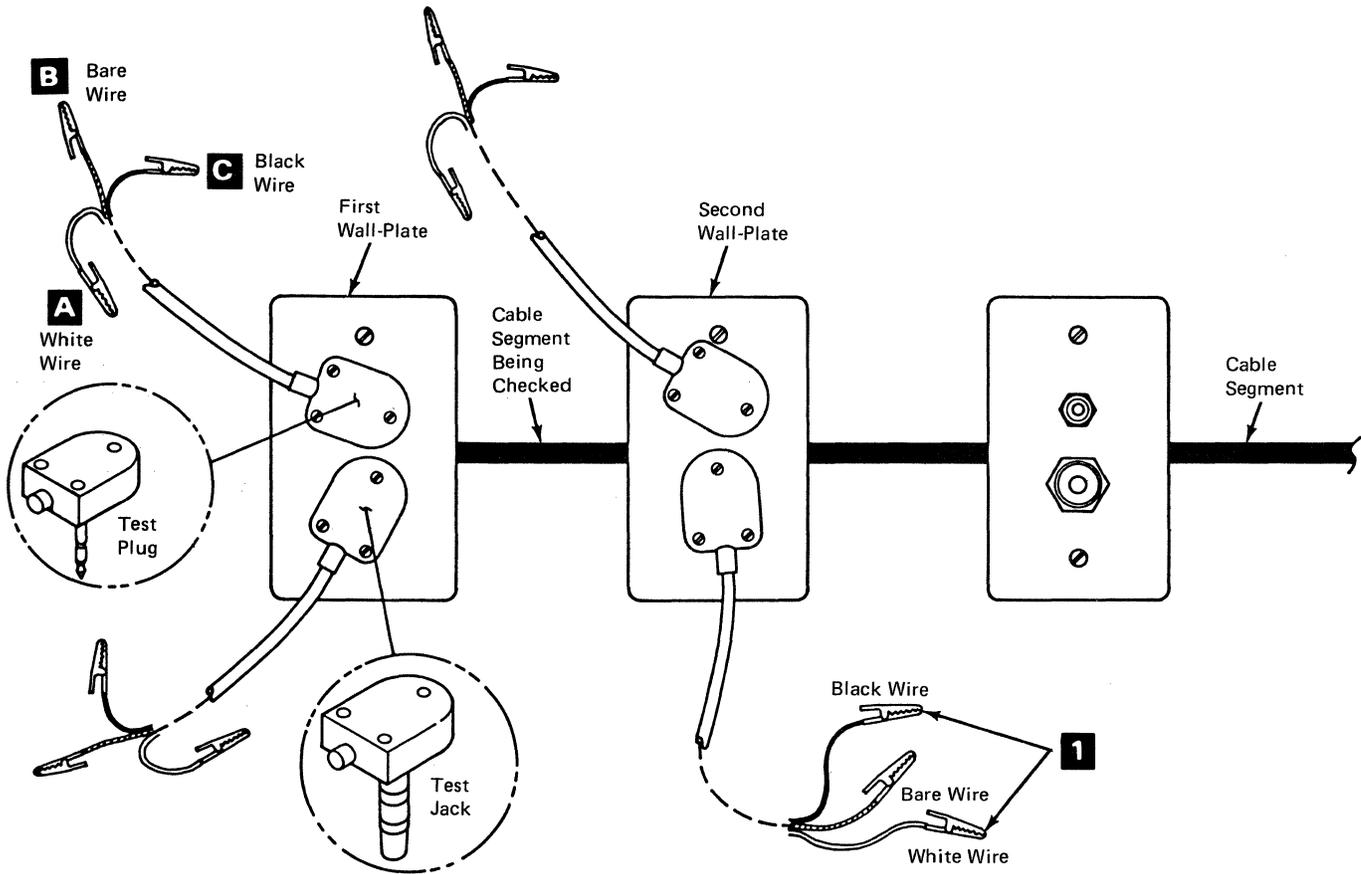
**| Checking the Cable Segments and Wall-Plates**

This test consist of a series of procedures designed to check the cable segments and the wall-plates. The following chart illustrates the testing sequence:



## Checking the Loop Cable Segments (Part 1 of 4)

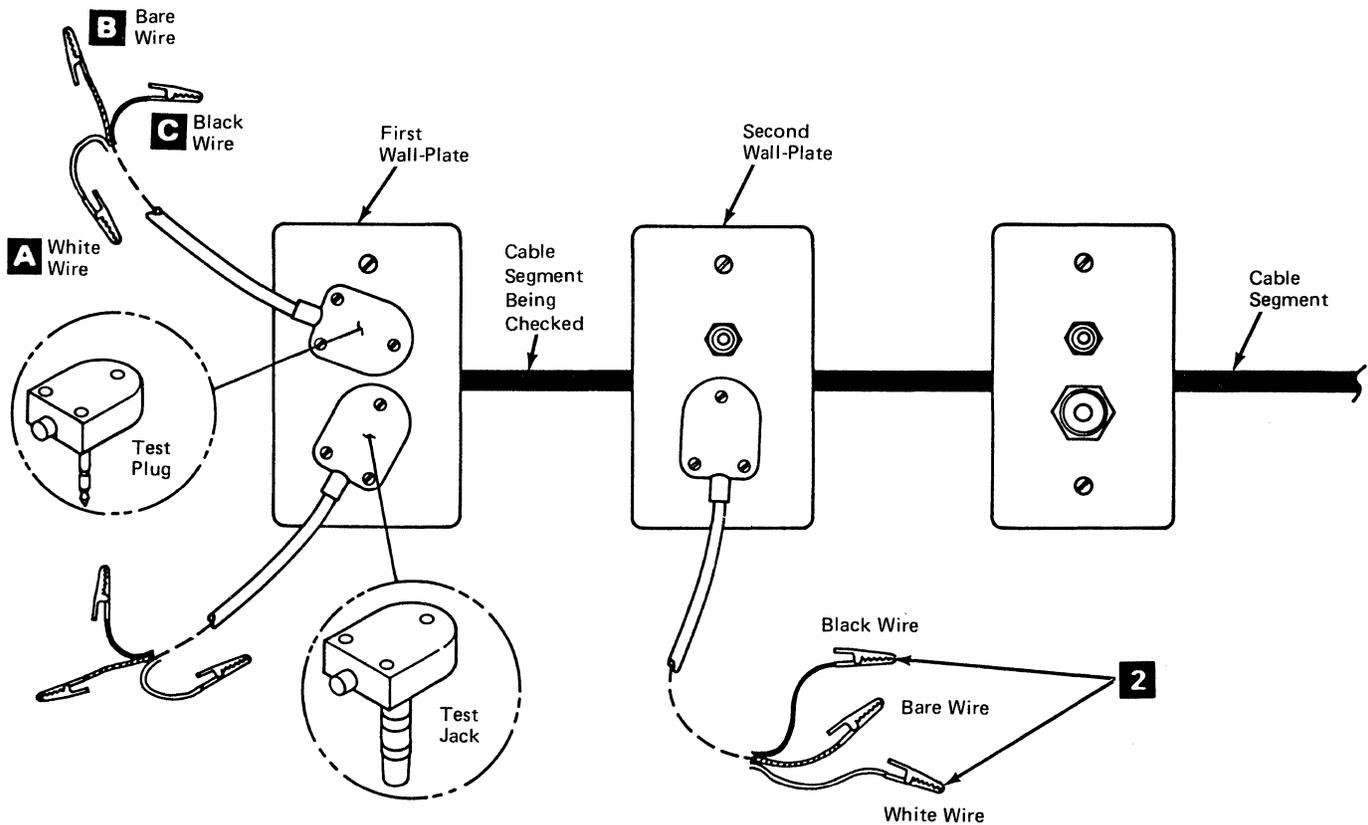
1. Connect a Test Plug and Jack in the first wall-plate on the loop.
2. Connect a Test Plug and Jack in the second wall-plate on the loop.
3. Connect the white wire and the black wire **1** of the Test Jack, then measure the resistance between the following points:
  - **A** and **C**  Meter Reading = Zero to 80 Ohms



- If you obtain the specified meter reading, continue to *Part 2 of 4*.
- If you do not obtain the specified meter reading:
  - Ensure that the first and second wall plates are wired correctly.
  - If both wall plates are wired correctly and you still do not obtain the correct meter reading, the cable segment between the two wall plates is faulty. Replace the cable segment, then start again at step 1 of this procedure.

### Checking the Wall-Plates (Part 2 of 4)

4. Ensure that a Test Plug and Jack is connected to the first wall-plate on the loop.
5. Remove the Test Plug from the second wall-plate.
6. Connect the white wire and the black wire **2** of the Test Jack, then measure the resistance between the following point:
  - **A** and **C**  *Meter Reading = Zero to 80 Ohms*



- If you obtain the specified meter reading, continue to *Part 3 of 4*.
- If you do not obtain the specified meter reading, the wall-plate being measured is faulty. Replace the wall-plate, then start again with *Part 1 of 4*.

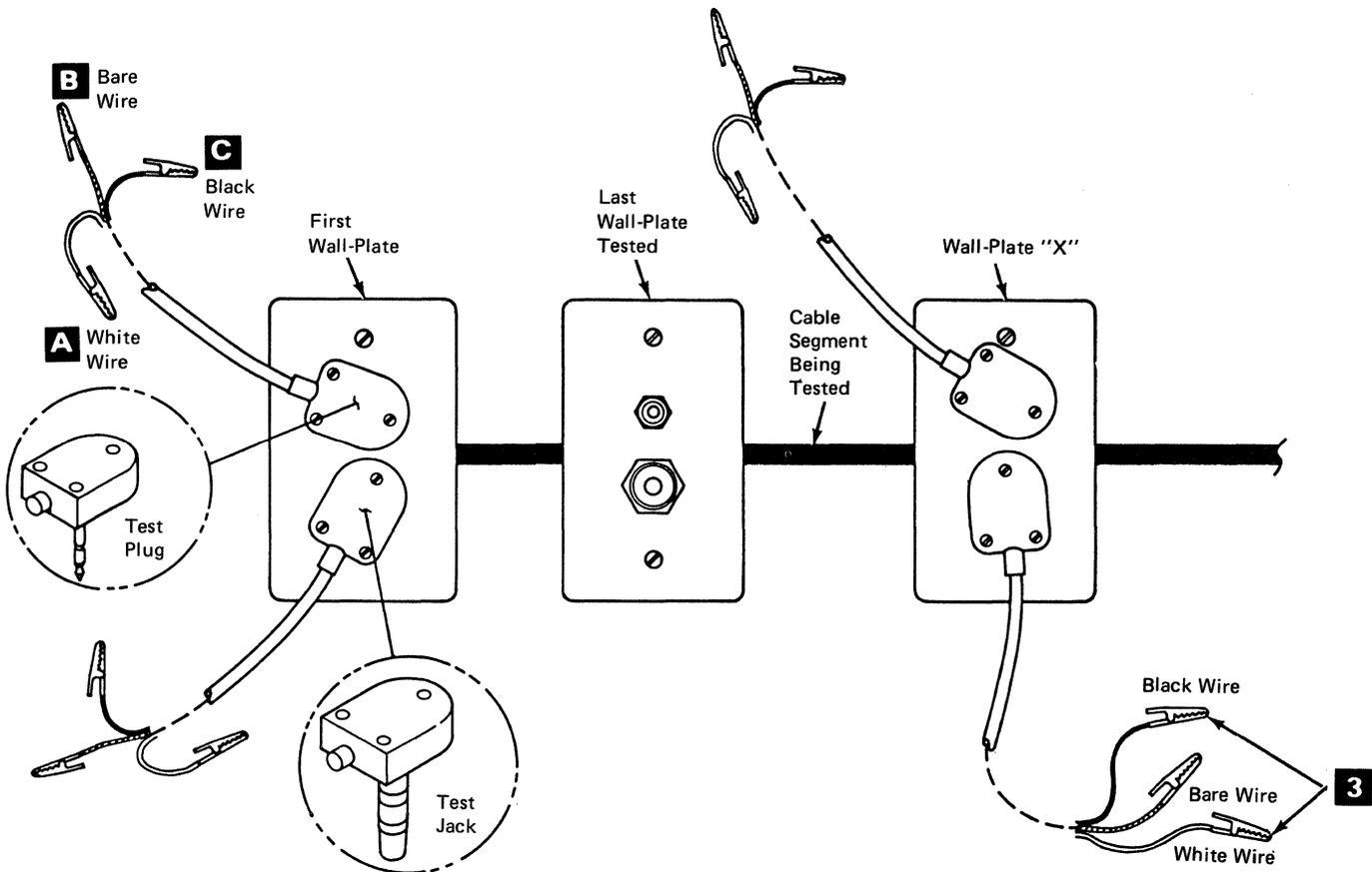
### Checking the Cable Segments (Part 3 of 4)

7. Ensure that a Test Plug and Jack is connected in the first wall-plate on the loop.
8. Connect the other pair of Test Plug and Jack to wall-plate "X"

**Note:** Wall plate "X" is the next wall plate after the one just tested.

9. Connect the white wire and the black wire **3** of the Test Jack, then measure the resistance between the following points:

- **A** and **C**  Meter Reading = Zero to 80 Ohms



- If you obtain the specified meter reading, continue to *Part 4 of 4*.
- If you *do not* obtain the specified meter reading:
  - Ensure that wall-plate "X" is wired correctly.
  - If wall-plate "X" is wired correctly and you still do not obtain the correct meter reading, the cable segment between wall plate "X" and the last wall plate tested is faulty. Replace the cable segment, then start again with *Part 1 of 4*.

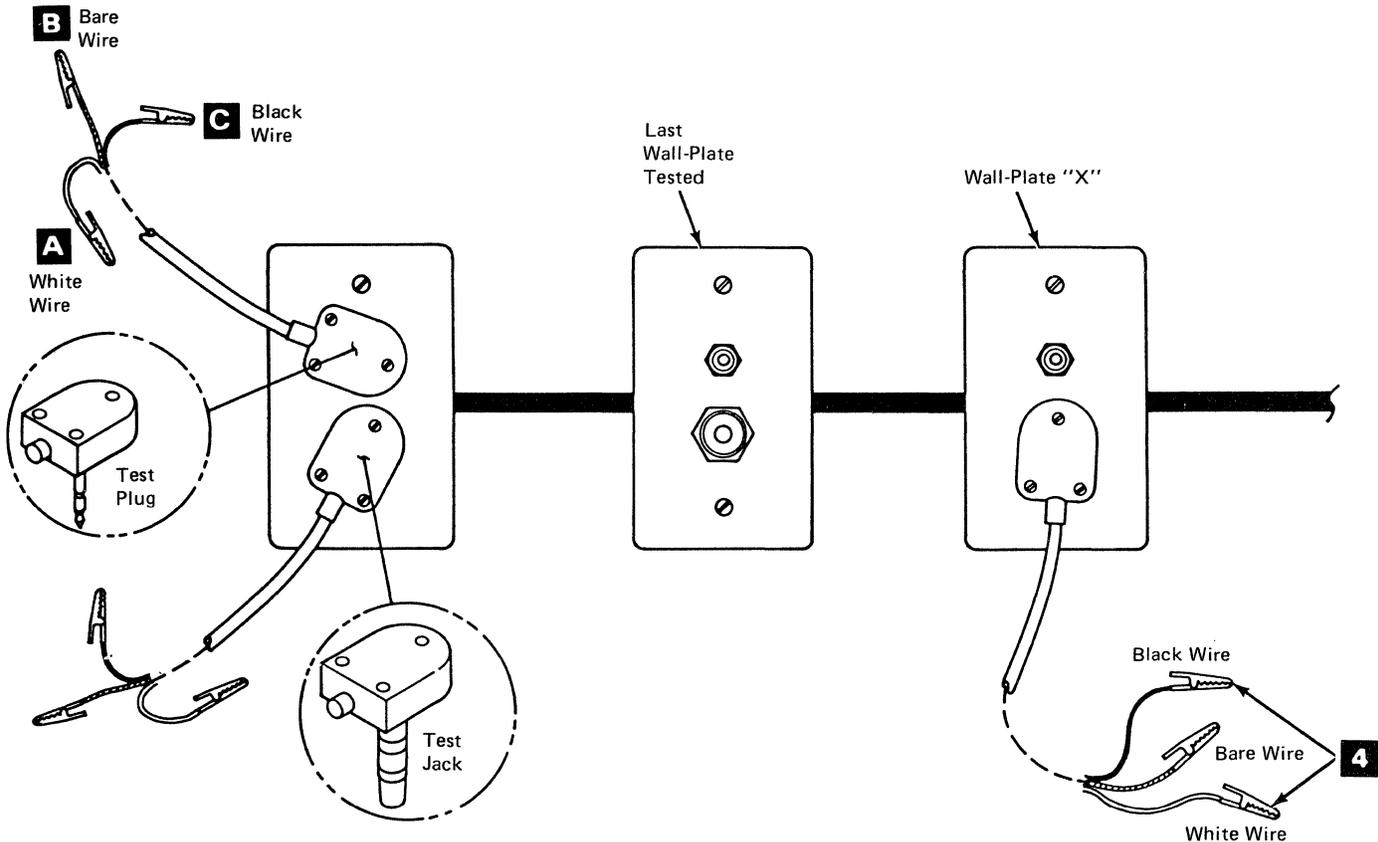
## Checking the Wall-Plates (Part 4 of 4)

10. Ensure that a Test Plug and Jack is connected to the first wall-plate on the loop.

11. Remove the Test Plug from the wall-plate "X."

12. Connect the white wire and the black wire **4** of the Test Jack, then measure the resistance between the following point:

- **A** and **C**  Meter Reading = Zero to 80 Ohms



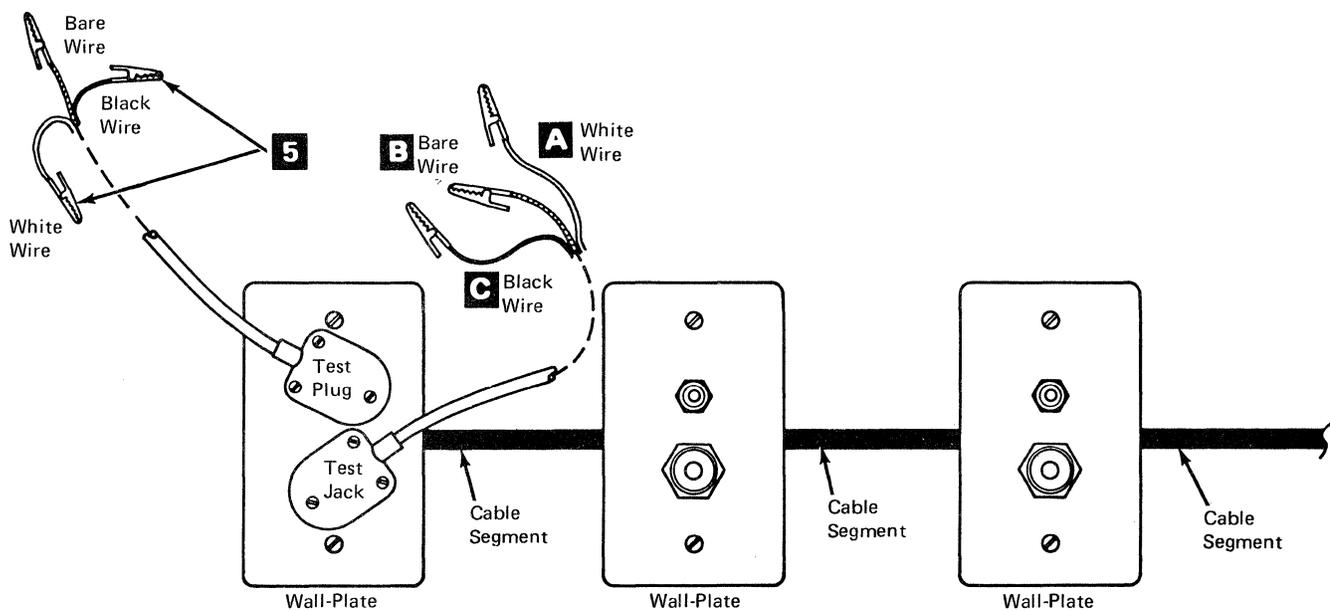
- If you obtain the specified meter reading, go to the next wall-plate and repeat *Part 3 of 4*.

After you have tested the last wall-plate on the loop, continue to the next procedure "Checking the Return Cable Run."

- If you do not obtain the specified meter reading, the wall-plate being measured is faulty. Replace the wall-plate, then start again with *Part 1 of 4*.

## Checking the Return Cable Run

1. Ensure that a Test Plug and Jack is connected to the first wall-plate on the loop.
2. Ensure that the Test Plug and Jack is removed from the last wall-plate on the loop.
3. Connect the white wire and the black wire **5** of the Test Plug, then measure the resistance between the following point:
  - **A** and **C**  Meter Reading = Zero to 80 Ohms



- If you obtain the specified meter reading, go to the next procedure “Checking For Grounding.”
- If you *do not* obtain the specified meter reading, the Return cable run is faulty.

The return cable run is identified in Figure 5-19 on page 5-41, connected through the butt connectors.

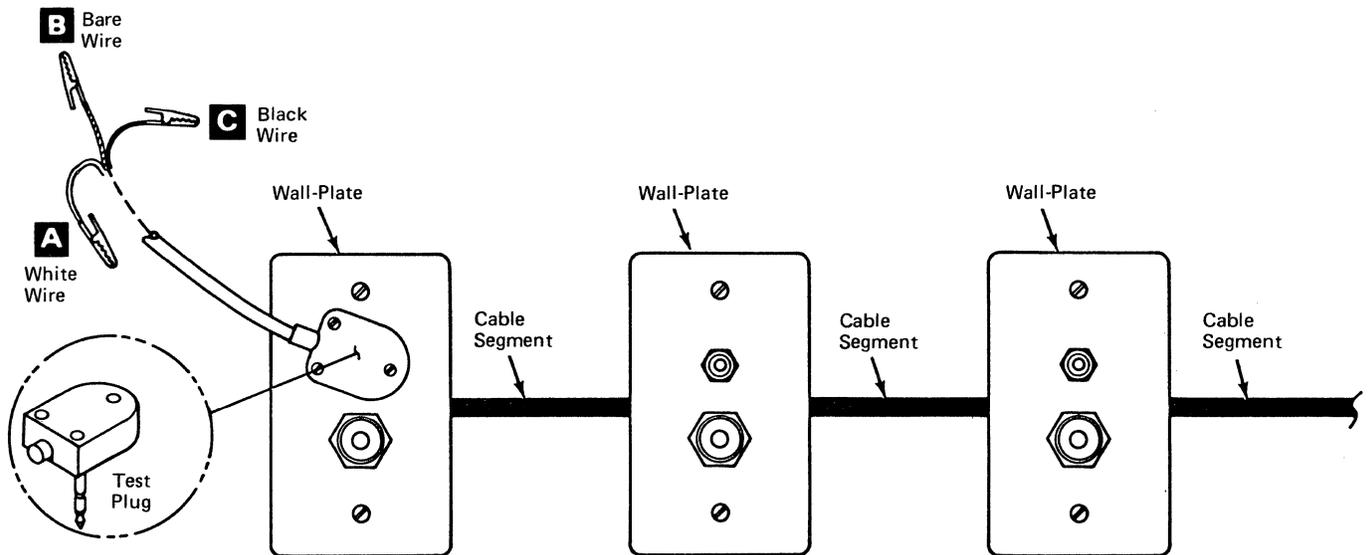
Repair the return cable run, then start again with *Part 1 of 4*.

## Checking for Grounding

Connect the test plug to each wall-plate on the loop and measure the resistance between the following points:

- **A** and building ground  *Meter Reading* = Infinity
- **B** and building ground  *Meter Reading* = Infinity
- **C** and building ground  *Meter Reading* = Infinity

**Note:** An example of a building ground is the screw usually found on the basic electrical outlet.



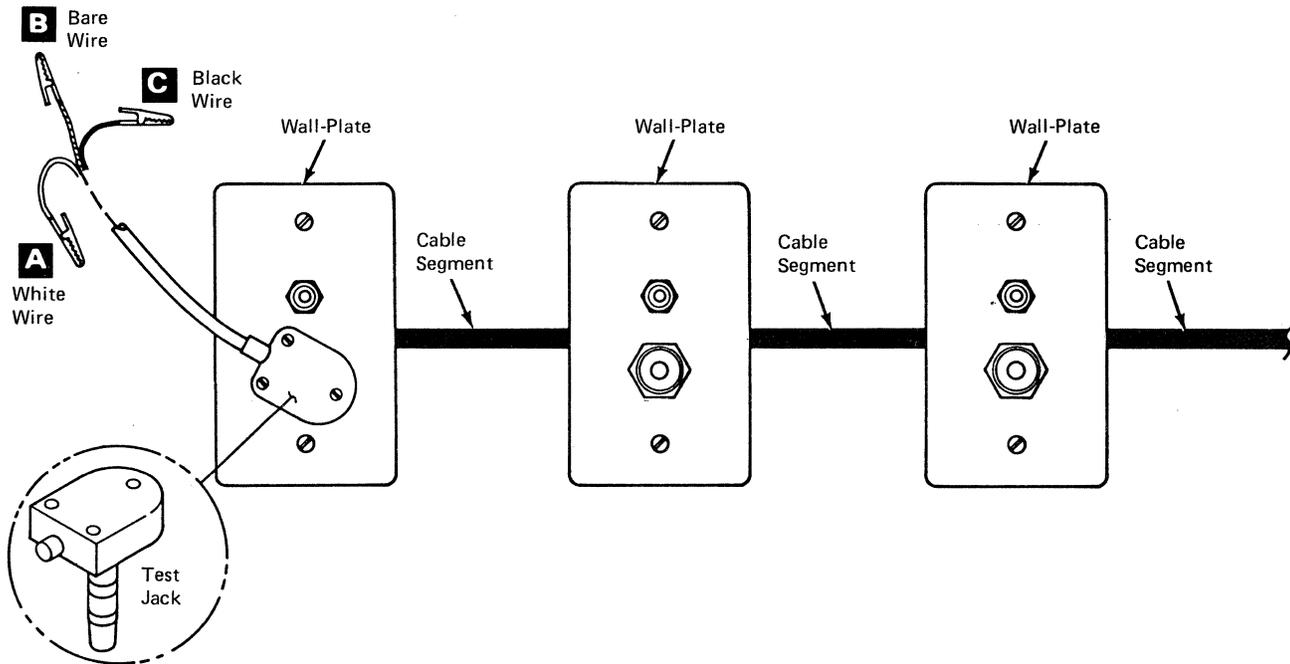
- If you obtain the specified meter readings, continue to the next procedure “Checking for Shorted Connections”
- If you do not obtain the specified meter readings, a ground exists somewhere on the loop. Some of the possible problems could be:
  - Wires touching the electrical terminal box
  - Soldering problem
  - Cable clamp is shorting the wiring.

Repair the problem and start again at the beginning of “Loop Checkout Procedures #2”

## Checking for Shorted Connections

Connect the Test Jack to each wall-plate on the loop and measure the resistance between the following points:

- **A** and **B**  Meter Reading = Infinity
- **A** and **C**  Meter Reading = Infinity
- **B** and **C**  Meter Reading = Infinity



- If you obtain the specified meter readings, you have a good loop. "Loop Checkout Procedures #2" is complete.
- If you *do not* obtain the specified meter readings:
  - Ensure that each wall-plate is properly wired.
  - If each wall-plate is wired correctly and you still can not obtain continuity, one or more of the cable segments contain a break. *Check each cable segment to locate the break.*

### **| *Remote Loop Checkout Procedure***

If you have a remote loop, you should ensure that both the sending and receiving signals of the modems are at the correct levels. Use your modem documentation to obtain the correct *Receive* and *Transmit* levels.



# Index

## Special Characters

"a" cable 5-10  
"f" cable 5-9, 5-10, 5-36  
"g" cable 5-10, 5-14

## A

administrative work station 2-4, 3-11  
application program test site 2-4

## B

branch circuit grounding 3-18, D-1  
branch circuit recommendations 3-16  
branch equipment inventory work sheet A-1  
branch relief team 2-6  
bulk loop cable specifications 5-25  
bulk loop cable specifications chart 5-26

## C

cable "a" 5-10, 5-22  
cable "b" 5-22  
cable "d" 5-22  
cable "f" 5-9, 5-22, 5-23  
cable "g" 5-10, 5-23  
cable "i" 5-23  
cable inventory sheet A-3  
cable keys 5-8  
cable limitations 5-8  
cable part number 1563155 5-9  
cable part number 5252769 5-9  
cabling  
  cable connectors 5-26  
  checks (after installation) G-9  
  checks (before installation) G-2  
  EIA/CCITT 5-3  
  host-link 5-1  
  information 5-1  
  installation checks G-1  
  inventory sheet A-3  
  inventory work sheet 5-1  
  local loop needs 5-16  
  loop cable chart 5-26  
  remote loop B-1  
  remote loop check G-23  
  remote loop needs 5-18  
  right-angle connector specifications 5-28  
  wall-plate connector specifications 5-30  
  X.21 5-4  
cabling information 5-45  
checking for continuity (loop checkout) G-11  
checking for grounding (loop checkout) G-12, G-21  
checking for shorts (loop checkout) G-13, G-22  
checking the cable segments (loop checkout) G-16, G-18  
checking the loops 5-42  
checking the return cable run (loop checkout) G-20  
checking the wall-plates (loop checkout) G-17, G-19  
clearances  
  administrative keyboard 6-23  
  alphameric keyboard 6-21

disk expansion unit 6-7  
diskette expansion unit 6-5  
encrypting PIN keypad 6-27  
expanded alphameric keyboard 6-22  
function keyboard 6-20  
loop repeater 6-38  
magnetic stripe unit 6-24  
PIN keypad 6-26  
3603 terminal attachment unit 6-36  
4701 controller 6-3  
4704-1 (display station control module) 6-9  
4704-1 display station display monitor (large screen) 6-11  
4704-1 display station display monitor (small screen) 6-13  
4704-2 (display module) 6-15, 6-17  
4710 printer 6-30  
4720 printer (models 1 and 3) 6-32  
4720 printer (models 2 and 4) 6-34  
coaxial cable  
  nonassembled cable specifications 5-47  
  ordering 5-46  
  ordering bulk cable 5-47  
  ordering connectors 5-47  
  part numbers of preassembled cables 5-46  
common carrier facility specifications 4-4  
communication channel 4-1  
communication facilities 4-1  
communication lines  
  preparation 2-5  
  verification 3-15  
  when to check out 2-6, 3-15  
communication network design 2-4  
compatibility with 3600 System 1-1  
control module  
  information 3-9, 3-11  
  machine specifications 6-8  
  placement 3-8  
  teller work station 3-5, 3-6  
control module placement 3-8  
controller diskette (preparation) 2-6  
controller loop cables 5-13  
cradle 3-7, 6-18  
cradle mounting bracket 3-8  
cradle placement 3-7  
csu 1-1  
customer setup 1-1  
cut form specifications F-3  
cut form thickness F-3

## D

designing the system 2-4  
device cluster adapter 3-15, 5-1, 5-45  
disk expansion unit  
  plan view 6-6  
display monitor  
  adjustment 3-7  
  cradle 3-7  
  placement 3-8  
  riser 3-7  
  specifications 6-8  
  specifications (large) 6-10  
  specifications (small) 6-12  
display stations and devices 6-8

## E

- electrical code (information) 5-32
- electrical requirements 3-17
- electromagnetic compatibility 3-17
- electrostatic discharge 3-17
- equipment inventory work sheet A-1
- establishing education requirements 2-4
- extending the length of a loop 5-14

## F

- floor plan 5-1
- form specification highlights for 4700 printers F-1
- forms
  - cut form F-3
  - journal F-8
  - passbook F-5

## G

- grounding 3-17, D-1

## H

- host connections using a standard EIA/CCITT connector 5-3
- host connections using an X.21 connector 5-4
- host-link cables 5-1
- host-link cabling information 5-2
- humidity 3-16

## I

- indoor
  - DCA cable 5-46
  - loop cable 5-9
- installing and checking the loop 5-32
- instructors, training 2-5
- inventory control
  - cable 5-1, 5-3, 5-15
  - equipment 3-3

## J

- journal roll F-8
- journal roll capacity F-8
- journal specifications F-8

## K

- keyboard 3-5, 6-8, 6-20, 6-21, 6-22, 6-23

## L

- lightning protection
  - communication lines 3-18
  - loop cables (RPQ) 5-42
  - power lines 3-18
  - signal lines 3-18
- local loops 5-6
- loop cable descriptions 5-8

- loop cable segment test G-16, G-18
- loop cable separation guide 5-32
- loop cables and accessories 5-5
- loop checkout procedures 1
  - continuity test G-11
  - ground test G-12
  - short test G-13
- loop checkout procedures 2
  - cable segment test G-16, G-18
  - loop ground test G-21
  - loop short test G-22
  - return cable run test G-20
  - wall-plate test G-17, G-19
- loop checks (after installation) G-9
- loop checks (before installation) G-2
- loop continuity test G-11
- loop ground test G-12
- loop installation checks G-1
- loop layout form A-5
- loop length limitations 5-8
- loop repeater 5-14
- loop repeater (specifications) 6-37
- loop repeater cable 5-10
- loop short test G-13
- loop terminal ports 5-11
- loops

- cable descriptions 5-8
- cable keys 5-8
- cable limitations 5-8
- components 5-8
- four-conductor cable 5-10
- introduction 5-5
- local 5-6
- remote 5-7
- repeater 5-14
- terminal ports 5-11, 5-24
- two-conductor cable 5-9
- types 5-5

## M

- machine specifications 6-14, 6-19
  - administrative keyboard 6-23
  - alphameric keyboard 6-21
  - cradle for 4704 displays 6-18
  - disk expansion unit (feature) 6-6
  - diskette expansion unit (feature) 6-4
  - encrypting PIN keypad 6-27
  - expanded alphameric keyboard 6-22
  - function keyboard 6-20
  - loop repeater 6-37
  - magnetic stripe unit 6-24
  - PIN keypad 6-25
  - 3603 6-35
  - 4701 controller 6-2
  - 4704-1 (control module) 6-8
  - 4704-1 (large display monitor) 6-10
  - 4704-1 (small display monitor) 6-12
  - 4704-2 (display module) 6-14
  - 4704-3 (display module) 6-16
  - 4710 printer 6-29
  - 4720 printer (1 & 3) 6-31
  - 4720 printer (2 & 4) 6-33
- major installation planning task 2-3
- maximum loop length 5-14
- modem 4-1
- modem definitions 4-1
- multipart forms F-3
- multiuse communication 5-2

## N

network control responsibility 2-5  
nonoperating environment 3-16

## O

operating environment 3-16  
ordering  
    coaxial cable 5-46  
ordering supplies and accessories 2-5

## P

page quality F-5  
paper weight F-3, F-5  
part numbers 5-9  
    four-conductor loop cables 5-10  
    loop cable chart 5-22  
    loop lightning protection RPQ 5-42  
    loop repeater 5-14  
    right-angle connectors 5-12  
    two-conductor loop cables 5-9  
    wall-plate connector 5-12  
passbook specifications F-5  
pedestal 3-7  
placement of printers 3-10  
plan views 6-6, 6-14, 6-19  
plan, floor 5-1  
power cords and outlets 3-17  
power cords, plugs, and receptacles C-1, D-1  
power outlet, placement 3-14  
product environment 3-16  
PTT modems 4-2

## R

remote loop cables B-1  
remote loop checkout procedure G-23  
remote loops 5-7  
return cable run test (wall-plates) G-20  
right-angle connectors 5-12  
riser 3-7

## S

second keyboard 3-5  
self-restoring contact 5-10, 5-12, 5-13  
setup team 2-6  
shipping environment 3-16  
site floor plan 5-1  
site preparation scheduling 2-4  
storage environment 3-16  
supplies and specifications F-1

## T

teller work station 2-4, 3-5  
temperature and humidity 3-16  
training instructors 2-5  
two-conductor cable (part number i563i55) 5-9  
two-conductor cable (part number 5252769) 5-9  
types of loops 5-5

## V

voltage and frequency requirements 3-17  
voltage limitations E-1

## W

wall-plate checkout G-17, G-19  
wall-plate connector 5-12  
work-station layout diagram 3-4  
WT power plugs and receptacles D-1

## X

X.21 connector 5-2

## 4

4704 cradle 3-7, 6-18  
4704 display stations and devices 6-8  
4704 pedestal (4704 model 3) 3-7  
4704 riser (4704 models 1 and 2) 3-7



IBM 4700 Finance  
Communication  
Installation Planning Manual  
Order No. GC31-2018-3

**READER'S  
COMMENT  
FORM**

This manual is part of a library that serves as a reference source for systems analysts, programmers, and operators of IBM systems. You may use this form to communicate your comments about this publication, its organization, or subject matter, with the understanding that IBM may use or distribute whatever information you supply in any way it believes appropriate without incurring any obligation to you.

Your comments will be sent to the author's department for whatever review and action, if any, are deemed appropriate. Comments may be written in your own language; English is not required.

*Note: Copies of IBM publications are not stocked at the location to which this form is addressed. Please direct any requests for copies of publications, or for assistance in using your IBM system, to your IBM representative or to the IBM branch office serving your locality.*

Possible topics for comment are:

Clarity   Accuracy   Completeness   Organization   Coding   Retrieval   Legibility

If you wish a reply, give your name, company, mailing address, and date:

---

---

---

---

What is your occupation? \_\_\_\_\_

Number of latest Newsletter associated with this publication: \_\_\_\_\_

Thank you for your cooperation. No postage stamp necessary if mailed in the U.S.A.  
(Elsewhere, an IBM office or representative will be happy to forward your comments or you may mail directly to the address in the Edition Notice on the back of the title page.)

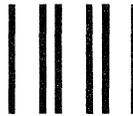
Note: Staples can cause problems with automated mail sorting equipment.  
Please use pressure sensitive or other gummed tape to seal this form.

Reader's Comment Form

Fold and Tape

Please Do Not Staple

Fold and Tape



NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

**BUSINESS REPLY MAIL**  
FIRST CLASS PERMIT NO. 40 ARMONK, N.Y.



POSTAGE WILL BE PAID BY ADDRESSEE:

**International Business Machines Corporation**  
Department 78C  
1001 W.T. Harris Boulevard  
Charlotte, NC, USA 28257

Fold and Tape

Please Do Not Staple

Fold and Tape



**This Newsletter No.** GN31-7319

**Date** 11 Nov 83

**Base Publication No.** GC31-2018-3

**File No.** S370/4300/8100/S34-15

**Prerequisite Newsletters** None

**4700 Finance  
Communication System  
Installation Planning**

© Copyright IBM Corp. 1981, 1982, 1983

This Technical Newsletter provides replacement pages for the subject publication.  
Pages to be removed and inserted are:

**Remove**

F-3 through F-10

**Insert**

F-3 through F-10  
F-10.1, F-10.2

A change to the text or to an illustration is indicated by a vertical line to the left of the change.

**Summary of Amendments**

This Technical Newsletter reflects updates to the 4720 Printer Forms information.

*Note: Please file this cover letter in the manual to provide a record of changes.*

File Number  
S370/4300/8100/S34-15

Publication Number  
GC31-2018-3

Printed in  
USA

**IBM**