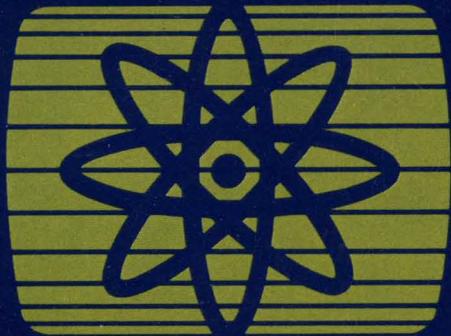
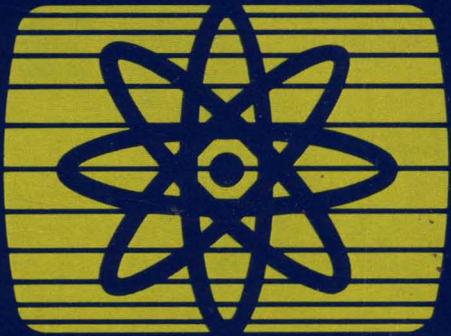


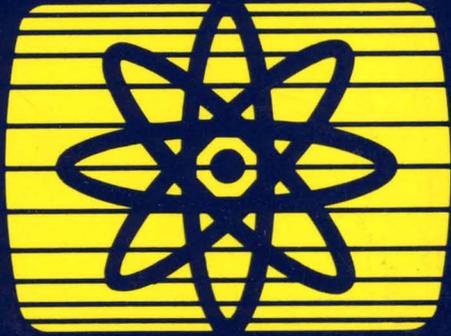
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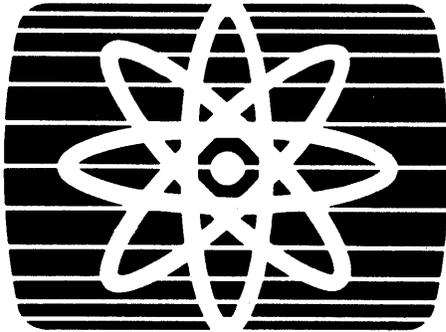


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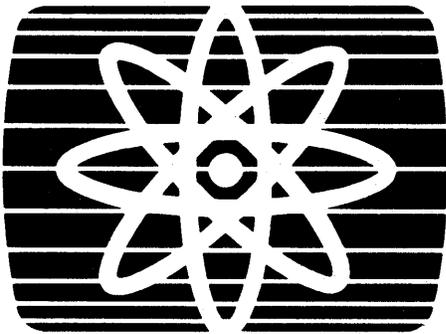


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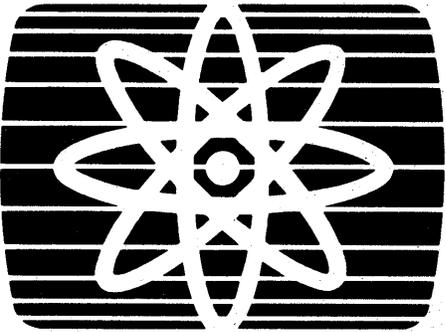
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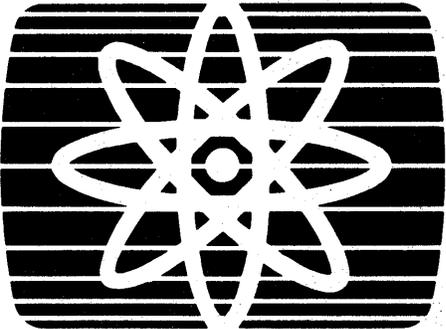
7171



**ASCII
Device
Attachment
Control
Unit**



**Description
and Planning
Guide**



GA24-4019-2

IBM

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 instruction 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.

Second Edition (April 1985)

This edition, GA24-4019-2, is a major revision of GA24-4019-1, and applies to the initial release of the 7171 ASCII Device Attachment Control Unit and to all subsequent releases of this product until otherwise indicated in new editions or Technical Newsletters. The changes incorporated in this revision are primarily for release to non-US countries.

Changes or additions to the text and illustrations are indicated by a vertical line to the left of the change.

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Preface

This publication introduces the IBM 7171 ASCII Device Attachment Control Unit. It presents an overview of the 7171, Site Planning Information, Installation, Problem Determination Procedure (PDP), and it explains how the IBM 7171 emulates 3270 terminal functions for ASCII display terminals.

Audience

Any user or potential user of the 7171 including managers, system programmers, application programmers, site planners, service personnel and operators should be familiar with portions of and concepts of this manual, depending on individual needs.

Organization

This manual has five chapters, and four appendixes.

Chapter 1. Introduction to the IBM 7171 describes the IBM 7171 and lists the attached ASCII devices that it supports.

Chapter 2. Site Preparation and Planning describes suggested customer site preparation and environmental requirements for the IBM 7171.

Chapter 3. Installation describes how to install the 7171. This procedure includes the following:

- Unpacking the 7171.
- Functional verification.
- HOST/7171 channel cable attachment.
- Verification of 7171 installation.

Chapter 4. Problem Determination Procedure (PDP) explains how to recognize and resolve 7171 problems in a step by step manner.

Chapter 5. Using ASCII Display Terminals on the IBM 7171 explains how the IBM 7171 emulates 3270 terminal functions for ASCII display terminals.

Appendix A. Setup of Addressing in the 7171 explains how to set up the addresses in the 7171, of the ASCII Devices associated with the 7171, to match the 3270 addresses generated by the host system.

Appendix B. Communication Interface describes the 7171 EIA RS-232-C communication connection interface for locally and remotely attached ASCII devices.

Appendix C. IBM 7171 Safety Checklist explains the earth grounding path of the 7171 from the input line cord plug to its ultimate termination at the individual replaceable components.

Appendix D. IBM 7171 Channel Cabling Schematic describes the cables needed to interface with the host system.

Glossary. Definitions of terms and abbreviations used in this document.

Product and Environmental Safety

Safety is a major consideration in the design of IBM products. Environmental safety is the responsibility of the customer. The following factors should be considered:

- Emergency disconnection of power to the branch circuits serving the equipment.
- Operating clearances (see "Physical Specifications," Chapter 2).
- Proper wiring and grounding of branch circuits (see "Branch Circuit Grounding," Chapter 2).
- Lightning protection for power and communication lines.
- The installation must meet local and national electrical code specifications.

Related Manuals

- *IBM 7171 ASCII Device Attachment Control Unit Reference Manual and Programming Guide, GA24-4020*
- *IBM 3270 Information Display System 3274 Planning, Setup, and Customizing Guide, GA27-2827*
- Electronics Industries Association (EIA) Standard (RS-232-C) *Interface Between Data Terminal Equipment and Data Communication Equipment Employing Serial Binary Data Interchange, August 1969*
- *CCITT, Data Communication over the Telephone Network, Yellow Book Volume VIII.1 for Recommendation V.24*

- *Data Communications - 25-pin DTE/DCE Interface Connector and Pin Assignments*, (ISO 2110) International Organization for Standardization (ISO)
- *An Introduction to the IBM 3270 Information Display System*, GA27-2739
- *IBM 3274 Control Unit Description and Programmer's Guide*, GA23-0061.

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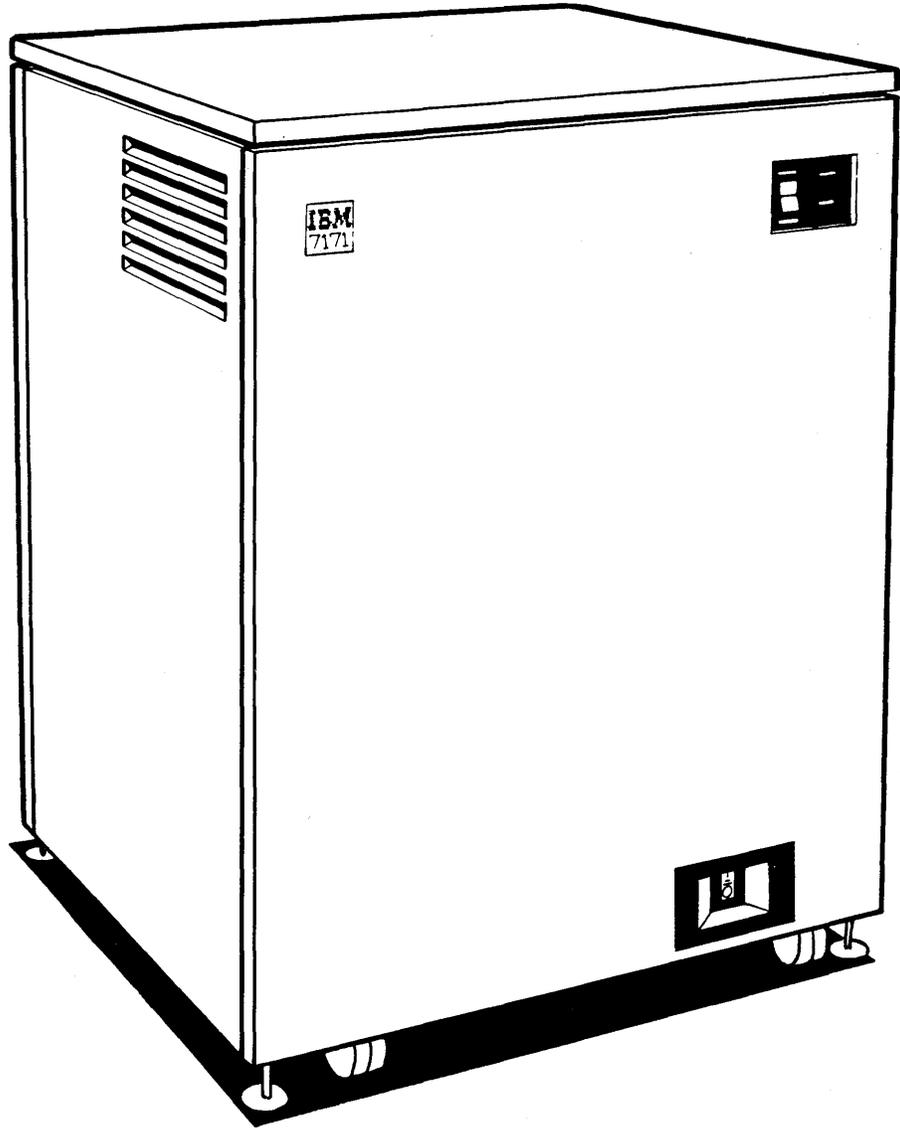


Figure 1. IBM 7171 ASCII Device Attachment Control Unit

Chapter 1. Introduction to the IBM 7171

Overview

The IBM 7171 ASCII Device Attachment Control Unit provides the ability to attach a variety of full duplex ASCII devices directly to IBM host processors via a shared block multiplexer channel. Attachment of 16 to 64 ASCII devices is supported via the RS-232-C electrical interfaces at speeds of 50 to 19,200 bits per second. This baud rate is limited only by the facilities of the communication link and the ASCII device. Autobaud (automatic BAUD rate recognition) is available on a per line basis for 300, 600, 1200, 1800, 2400, 3600, 4800, 9600 and 19200 baud.

These devices may be connected directly to the IBM 7171 without modems, or via leased or switched lines using line drivers, modems or acoustic couplers.

The IBM 7171 provides ASCII to IBM 3270 protocol conversion. The 7171 Control Unit appears to the host processor as one or two IBM 3274 model 1D Control Units. The IBM 7171 attaches only to a block multiplexer channel. The attached ASCII display terminals and printers appear to the host system as IBM 3278 terminals and IBM 328x printers.

IBM 3270 emulation allows the IBM 7171 attached devices to communicate with IBM interactive packages utilizing existing 3270 programs with no host modification required.

IBM 3270 emulation extends the capabilities of the ASCII device by providing 3270 type functions. These functions include; program function keys, program attention keys, light pen simulation, numeric-only input fields, highlighting, protected field skip, unformatted screens and editing functions such as, character insert and delete, forward and backward field tabs, erase to end of field, clear screen and cursor movements.

In addition to 3270 emulation, extended functions have also been included. These functions include; type-ahead capability, enhanced null/blank handling, XON/XOFF pacing, dynamically redefinable home position and forward and backward column tabbing.

Supported Devices

The IBM 7171 allows attachment of a wide variety of ASCII devices. The minimum criteria for device attachment is:

- Point to point connection,
- 7 bit ASCII code,
- Full duplex protocols and
- Character mode transmission.

Interactive ASCII devices must perform the following functions upon receipt of appropriate character sequences from the communication line:

- Clear screen or clear to end of screen,
- Absolute cursor positioning and
- A character written to a screen position should replace, not overstrike, the previous character in that position except in APL mode.

Device characteristics are contained in Terminal Definition Tables. Default tables are shipped with the IBM 7171 to support a variety of ASCII device types, including the IBM 3101.

The customer may use existing tables to attach these device types, or, may modify existing tables or create new tables to support attachment of other devices. This modification may be accomplished directly at the machine level or via a supplied IBM 7171 support utility. The utility requires an IBM Personal Computer with the Personal Computer Disk Operating System Version 2.00 (or equivalent) with an Asynchronous Communication Adapter, a minimum of 128K RAM, and one Dual Sided Diskette Drive (360kB).

Color terminals can be defined to emulate IBM 3279 "basic color." Basic color means that four different colors are assigned to protected/unprotected and highlighted/normal fields. Selection of color is table defined.

A special 3270 order sequence provides for transparent output (ASCII data from the host to the device) to hardcopy ASCII devices such as printers and plotters.

Chapter 2. Site Preparation and Planning

Site Planning

This chapter contains site planning information necessary to prepare your site for the IBM 7171 ASCII Device Attachment Control Unit.

A sample site planning checklist, Figure 4, at the end of this chapter contains a sequence of representative tasks that may be helpful in planning your facility. These are suggestions only and will have to be modified to meet the needs of your facility. It is advisable to designate one person to be responsible for site planning.

Customer Responsibility

The customer is responsible for:

- Adequate site, system and other physical preparation
- Obtaining communication cables
- Receipt at the customer's receiving dock, unpacking and placement of the IBM 7171
- Physical set up and connection of cables to communication lines/modems
- Creating additional Terminal Definition Tables, as required, to match local configurations

Site Preparation

Prior to the arrival of the IBM 7171 ASCII Device Attachment Control Unit at the designated site, a floor plan should be generated and all preliminary installation work completed. The information in this chapter covers device attachment cables, physical/electrical specifications, and environment requirements that will help you prepare your floor plan.

The floor plan should provide the following information:

1. The location of the IBM host processor.
2. The location of the IBM 7171 Control Unit and other control units on the same channel.
3. The locations of all locally attached ASCII devices and associated modems for remotely connected ASCII devices. Labels on each device are recommended to identify the 7171 port to which the device is assigned.
4. All required cables to the attached devices should be shown, including routing information. Affix labels to each end of the cables, on installation, to designate the correct device and 7171 port location. Refer to Appendix B for information on RS-232-C cables.
5. The location of power receptacles for each attaching ASCII device, modem, and the 7171.
6. (US only)-If a waterproof 7171 AC power connector is desired for a raised floor environment, it should be specified in the initial sales order. The corresponding receptacle, Russellstoll¹, "in-line" receptacle FSU3913U-1 or "Panel" receptacle FSU3743U-1, or equivalent, must be installed at your site.

In addition to the floor plan, the 7171 site should be provided with complete instructions for the set up and operation of each attached ASCII device.

ASCII device installation, set up, cable installation, labeling, power installation, and modem installation should be completed before your 7171 arrives.

Attachment Considerations

The 7171 will require EIA RS-232-C communication cables to attach the ASCII devices to the 7171 output ports. The output port connections of the 7171 are 25-pin, male, RS-232-C 'D' Shell Connectors. To the attaching communications devices, the 7171 appears as 'Data Terminal Equipment' (DTE). The connector at the opposite end of the cable is determined by the type of interface; direct connect or modem and the type of device. The 7171 will support communication cables whose total overall length does not exceed 50 ft. The communication cable specification for the supported 7171 EIA/CCITT communication interface is described in detail in Appendix B.

¹ Russellstoll is a registered trade mark of the Midland-Ross Corp., Livingston, NJ 07039.

Physical and Electrical Specifications

Physical Specifications

Dimensions:

	Front	Side	Height
cm	76.2	69.9	100.4
(inches)	(30.0)	(27.5)	(39.5)

Packing Box

	Front	Side	Height
cm	80.0	73.7	111.8
(inches)	(31.5)	(29.0)	(44.0)

Weight:

Unpacked: 92.5kg (204 lb)

Packed: 103 kg (227 lb)

Heat Output:

watts/hr	500
(BTU/hr)	(1706)

Airflow (Bottom exit fans):

Forced air 2.84 cubic
meters/min.
(100 cubic feet/min.)

Operating Clearances: (See Figure 2.)

The 7171 requires clearances for cabling, opening covers, airflow etc. as follows:

Front	76.2 cm (30.0 in.)
Rear	76.2 cm (30.0 in.)
Right	28.5 cm (12.0 in.)
Left	28.5 cm (12.0 in.)
Bottom	This area must be unobstructed to allow free airflow.

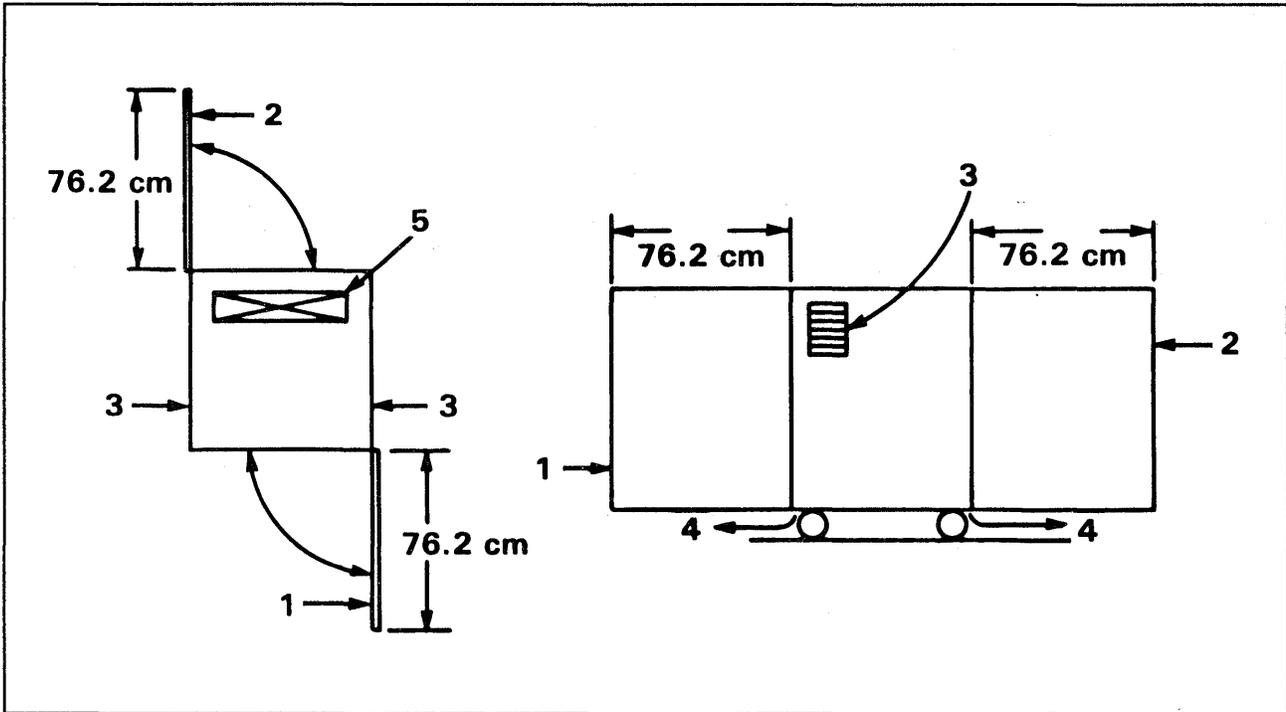


Figure 2. Plan view of the 7171

- 1. Front door (76.2cm)
- 2. Rear door (76.2cm)
- 3. Air inlet
- 4. Air out
- 5. Frame cutout (10.2cm X 57.2cm)

Electrical Specifications:

VA: 0.5 kVA (maximum)

Phase: 1

Frequency: Permissible Variance

	minimal	nominal	maximum
50 Hz.	47	50	53
60 Hz.	57	60	63

Power Cable:	18 AWG		
Voltage:	Permissible Variance		
	Minimum	Nominal	Maximum
	90	115	130
	190	230	264

The 230V 7171 is not available in the US or Canada.

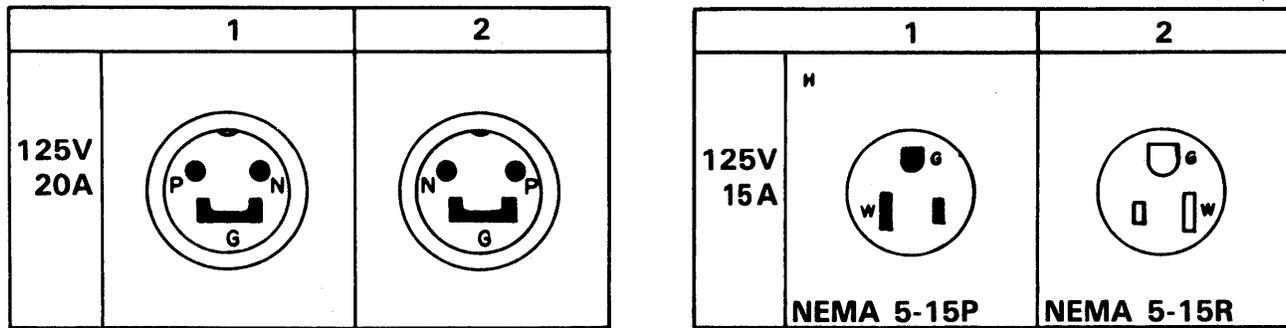


Figure 3. 7171 power plug and wall receptacle for use in the U.S. and Canada (Water tight on left)

1. Plug
2. Receptacle

Manufacturer's Number (Russellstoll)

1. Plug 3720U-1
2. Receptacle 3743U-1
3. Inline 3913U-1

NEMA = National Electrical Manufacturer's Association configuration number

Power Cord

The 7171 does not have a removable power cord. The customer must supply the appropriate mating receptacle as a power source.

Branch Circuits and Grounding

The individual branch circuit within the customer's installation that is providing the power to the 7171 should have suitable circuit protection in accordance with the local and national electrical codes. Each protector should be labeled to identify the receptacle that it controls.

For safe operation, the branch circuit you provide for the 7171 must have an equipment grounding conductor. This grounding conductor must be connected either to the electrical service ground or to a suitable building ground.

CAUTION

The power cord for the 7171 is approved for use with this unit and meets the relevant testing laboratory or country test-house standards. For the 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. The customer is responsible for receptacle wiring.

Lightning Protection

Power Lines: The customer should install lightning protection on the customer (secondary) side of the power source if:

The utility company installs lightning protectors on the primary source.

The area is subject to electrical storms or power-line surges.

The customer must decide whether lightning protection is needed on the power distribution system, selecting the required service protection and having it installed properly.

Communication Lines: The customer should ensure that lightning protection is provided on the communication common-carrier lines.

Environmental Requirements

The 7171 is designed to operate under conditions typical of most modern machine room environments. If you plan to locate the 7171 in an environment different from this (where airborne particles, vapors, or gases can subject the unit to different contamination), contact your IBM marketing representative for additional information or assistance.

Operating Environment:

Temperature	10 to 32.2 Degrees C (50 to 90 Degrees F)
Relative Humidity	8% to 80%
Maximum Wet Bulb	22.8 Degrees C (73 Degrees F)

Nonoperating Environment:

Temperature	10 to 43.3 Degrees C (50 to 110 Degrees F)
Relative Humidity	20% to 80%
Maximum Wet Bulb	26.7 Degrees C (80 Degrees F)

Storage Environment:

Temperature	0.6 to 60 Degrees C (33 to 140 Degrees F)
Relative Humidity	5% to 80%

Maximum Wet Bulb 29.4 Degrees C (85 Degrees F)

Shipping Environment:

Temperature -40 to 60 Degrees C (-40 to 140 Degrees F)

Relative Humidity 5% to 100%

Maximum Wet Bulb 29.4 Degrees C (85 Degrees F)

Electromagnetic Compatibility

In some instances, the site chosen for setup may have ambient electromagnetic fields. These fields can result from nearby radio-frequency sources, such as transmitting antennas (AM, FM, television, and two-way radios), radar installations, or industrial equipment (radio-frequency induction heaters, arc welders, and insulation testers). Electrical equipment power distribution lines can generate magnetic fields that cause interference.

Other magnetic sources include transformers, distribution panels, rotating machinery, and electric floor heaters. Check with your building engineer. As a precautionary measure, locate the 7171 as far as possible from any magnetic sources.

Electrostatic Discharge

As a result of low humidity or movement, electrostatic charges build up on:

People, carts, or furniture with high-resistant covering

People in contact with furniture coverings such as plastic seats

Carpeting without antistatic properties.

Discharge of these charges to the 7171 may cause interference with the operation of the 7171 and discomfort to the operating personnel.

Acoustical Noise Level

The sound pressure level measured one meter from the 7171 will be no greater than 56 dBA (re 20 micropascals).

Disposal

Prior to disposing of the 7171 or any part thereof, contact the US IBM 7171 Support Number or the non-US IBM Service Representative for instructions as to proper disposal.

Site Planning Checklist

This planning checklist (see Figure 4) is provided as a sample plan. The plan may have to be modified to accommodate your unique installation. Make sure that the plan complies with the Product and Environmental Safety Requirements in this chapter.

12 Weeks Before Delivery

Designate a person to be responsible for all phases of installation.

Review this checklist with the person designated above.

If environmental problems are evident:

- Electromagnetic
- Electrostatic
- Particulates
- Corrosive Atmosphere
- Safety
- Security

review the site with your IBM representative.

Order and arrange for installation of communication cables from the 7171 to the ASCII devices or modems and the electrical wiring. Refer to Appendix B.

Ensure that system channel cables are being shipped with the 7171. If you need help, contact your IBM representative. Refer to Appendix D.

Identify and schedule communication facilities.

Order all related ASCII terminal manuals.

10 Weeks Before Delivery

Prepare a floor work plan for the 7171 location. Show the host system, the channel cables, modems, the 7171, the ASCII terminals, and the power receptacles.

Review the overall plan with your IBM representative.

Figure 4 (Part 1 of 2). Sample Site Planning Checklist

8 Weeks before Delivery

Review the progress of the plan. Resolve any conflicts of schedule, order, or configurations.

6 Weeks Before Delivery

Review installation plan, to define any exposure to schedule, with your IBM representative.

4 Weeks Before Delivery

Confirm the arrival of all communication cables.

Install and label communication cables and power receptacles.

Confirm that your Host Operating System and the channel are generated to support the 7171. Refer to "Host System Control Program Support of the 7171" following this table.

2 Weeks Before Delivery

Complete checkout of modems, cables, power, continuity check and polarity tests of communication cables, power receptacles. Review safety precautions.

Complete site preparation.

Install TP (Teleprocessing) lines and modems.

Arrival of the 7171

Move 7171 to site location. Use the unpacking instructions attached to the shipping container.

Provide a place to store the 7171 shipping container

Figure 4 (Part 2 of 2). Sample Site Planning Checklist

Host System Control Program (SCP) Support of the 7171

The SCP of the host system must be configured to support the 7171.

A 7171 which supports 32 or less terminal ports appears to the host system as a single IBM 3274-1D Control Unit with 32 or less 3278 terminals or 3286 printers attached. If the 7171 supports more than 32 terminal ports, it appears to the host as two 3274-1D's. The IBM 7171 attaches only to a block multiplexer channel.

The following manuals should be available for guidance in setting up the SCP to support the 7171:

- *7171 ASCII Device Attachment Control Unit Reference Manual and Programming Guide, GA24-4020*
- *3274 Control Unit Planning, Setup, and Customizing Guide, GA27-2827*
- *3274 Control Unit Description and Programmer's Guide, GA23-0061.*

The SCP must be configured to serve the 7171 ports consecutively. Port 0 in the 7171 is to be addressed as the first of the contiguous block of addresses that would be served by the first 3274-1D, port 31 as the last position served by the first 3274-1D; port 32 as the first position of the second 3274-1D and port 63 as the last position of the second 3274-1D. This is described in the following table:

Number of Ports Supported	SCP Generations
16	One 3274-1D with 16 contiguous addresses.
24 or 32	One 3274-1D with 32 contiguous addresses.
40 or 48	One 3274-1D with 32 contiguous addresses and a second 3274-1D with 16 addresses contiguous with the first 32.
56 or 64	One 3274-1D with 32 contiguous addresses and a second 3274-1D with 32 addresses contiguous with the first 32.

Chapter 3. Installation

This chapter is written primarily for personnel at the customer site who will assist in the set up and check out of the IBM 7171 ASCII Device Attachment Control Unit in the customer system environment.

This chapter contains procedures that must be performed sequentially to ensure a successful installation of the 7171. Each procedure requires one or more action steps. Read and understand each step before any action is taken.

Materials Needed

The Floor Plan Worksheet that was sent to you by the site planner.

Tools

The customer may require a screwdriver for connecting communication cables to the site ASCII devices, modems, and the 7171.

US 7171 Support Number

The US 7171 support number is included with the 7171 shipment. The phone number is available to customers who, after the warranty period, choose to service their own IBM 7171 and should be called under the conditions described in this document.

Non-US Support

Customers in non-US countries should contact their IBM Service Representative for assistance in problem resolution.

Figure 5. is an illustration (front view) of the 7171 with the front door opened. Familiarize yourself with the location of the following key items:

Card Container

Location and Identification of cards within container.

The first (left most) slot contains a CA (Channel Adapter) Card. The CA Card will fit only in the first slot.

For simplicity, the remaining cards are not shown in Figure 5. In your 7171, the second slot contains a CC (Channel Controller) card and the third slot contains a CPU card. These cards will fit only in these slots.

The fourth and fifth slots contain TC (Terminal Controller) Cards. This is the minimum 7171 configuration that will allow the attachment of 16 ASCII devices.

The remaining slots will contain one TC Card for every 8 ASCII devices above the minimum 16. If the 7171 is configured to support 64 devices, all of the slots will be filled.

Note: Each card has an alphabetic group of letters marked on the surface of the part that cams the card in its slot position. A corresponding alphabetic group of letters are marked on the surface of the Card Container immediately above each card slot location (see Figure 10 on page 33).

Location of Indicators on individual cards

Power Supply Air Deflector

Power Supply Air Deflector Fasteners

Power Supply and Power Supply Fasteners

Cooling Fans, Fan Power Cables, and Fan Fasteners

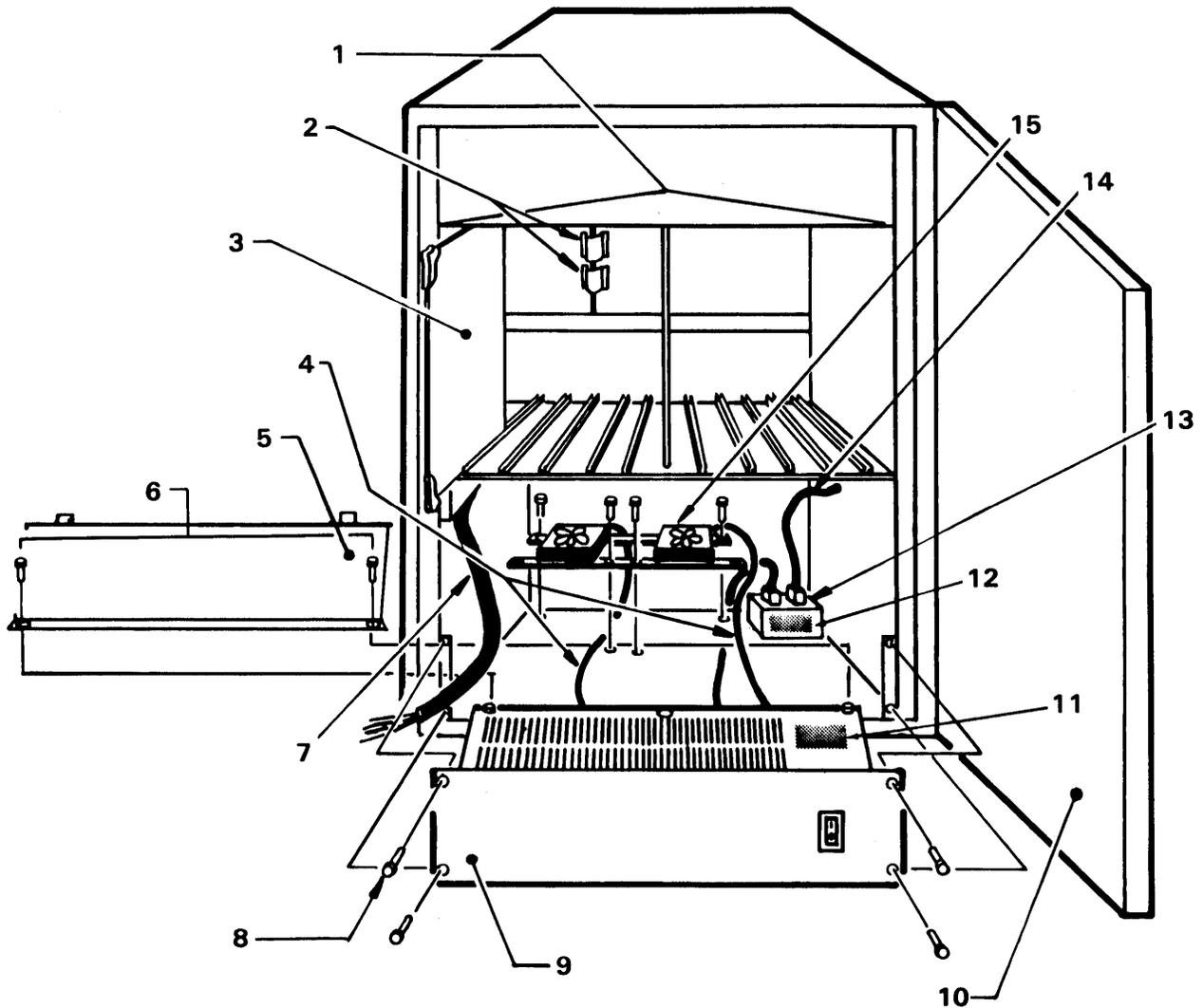


Figure 5. Illustration of the 7171 with the front door opened

1. Card container
2. Crossover cables
3. CA card
4. Fan AC cables
5. Air deflector
6. Air deflector fasteners
7. Power distribution cable
8. Power supply fasteners
9. Power supply
10. Front door
11. Warning 'HAZARDOUS AREA DO NOT REPAIR REPLACE ENTIRE POWER SUPPLY'
12. Warning 'HAZARDOUS AREA DO NOT SERVICE'
13. Line junction box
14. Line cord
15. Fans

IBM 7171 Physical Layout

Figure 6 is an illustration of the front of the 7171. Familiarize yourself with the locations of the following key items:

1. On Line/Off Line Switch
2. Power On Indicator
3. Ready Indicator
4. Main Power On/Off (I/O) Switch
5. Castor Locking Device.
6. EMC Pads

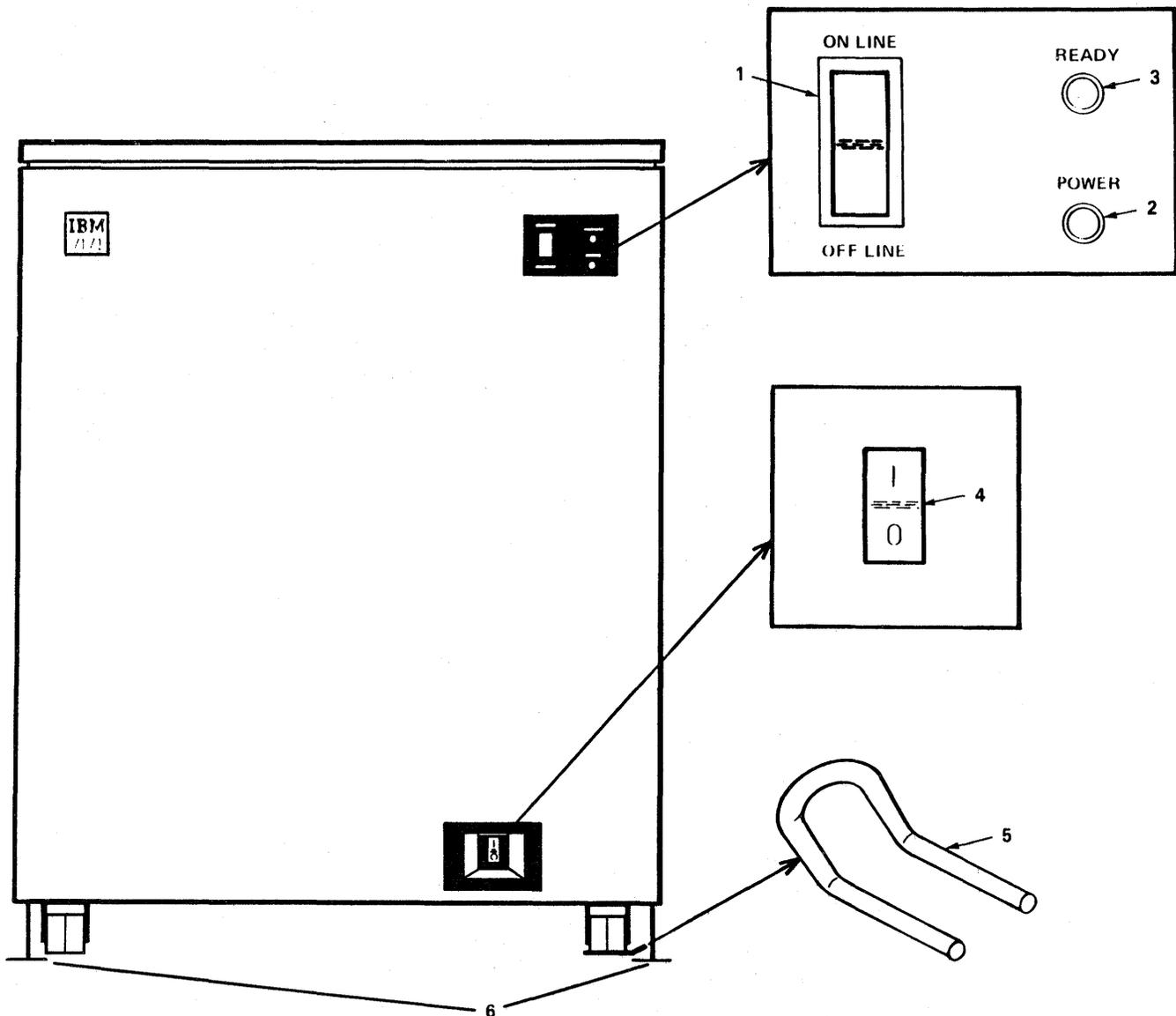


Figure 6. Illustration of the front of the 7171

Complete the Unpacking (Installer)

1. Remove the cardboard card retainer by removing the two thumb screws and retainer plates. Cut the plastic tie wrap holding the retainer to the vertical support rod. Thumb screws and retainer plates should be replaced for future use. Give the cardboard retainer to the customer to be saved with the rest of the packing material.
2. Remove the cable ties which are wrapped around the ejector ears on each card.
3. Check all thumb screws on the power supply and deflector plate and tighten any that may be loose.
4. Open the rear door and remove the two caster forks which are attached to the cable retaining plate. They will be installed as instructed later.
5. Remove the power cord from the cable retaining plate and route it down through the bottom plate and out the control unit. **DANGER. Do not connect the power cord at this time.**

Powering-up the 7171 (Installer)

If the 7171 has a molded line cord plug, the following steps are not necessary, proceed to the section entitled "Power On/Off Switch."

Site and 7171 Safety Checkout

This procedure must be performed for machines with Russellstoll connectors to ensure that the installation environment is safe. For plug and receptacle pin locations see Figure 7.

Suggested Tools required:

CE Tool Kit

Digital CE Meter (part 8496278)

High Voltage Test Probes (parts 1749249 and 1749250).

Checking the 7171 Power Plug

Repair all IBM product problems if any are found.

1. Verify that the 7171 power on/off switch is in the OFF position.
2. Make the following resistance measurements; a reading of less than .1 ohm shows a safe and continuous grounding conductor.

- a. Measure the resistance between the ground pin of the 7171 power plug and the 7171 frame.
 - b. Measure the resistance between the 7171 power plug shell and the 7171 frame.
- Note:* If the resistance values are less than .1 ohm, the 7171 power plug has a safe ground. Continue this procedure.
3. Make the following resistance measurements; a value greater than 2000 ohms shows a safe 7171 power plug.
 - a. Measure the resistance from the phase (P) and neutral (N) pin to the 7171 power plug shell.
 - b. Measure the phase-to-neutral (P-to-N) resistance of the 7171 power plug.

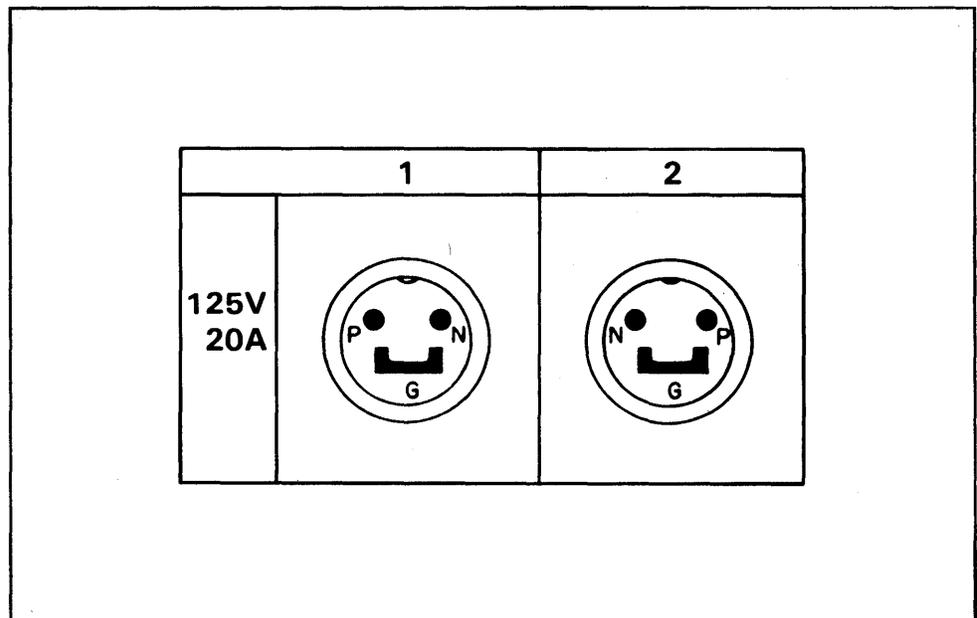


Figure 7. Illustration of the 7171 Waterproof Connector

1. Plug
2. Receptacle

Manufacturer's Number (Russellstoll)

- | | |
|---------------|---------|
| 1. Plug | 3720U-1 |
| 2. Receptacle | 3743U-1 |
| 3. Inline | 3913U-1 |

Checking the Customer Power Receptacle

If any problems are found:

- Alert the responsible Field Manager.
- Call your Installation Planning Representative (IPR) for assistance.
- Notify the customer of the problem.

DANGER

With the customer branch CB in the OFF position, do not touch the exterior shell of the customer receptacle with anything except the test probes until step 2 is complete.

Power must not be applied to the 7171 if the building ground cannot be located and verified.

Note: Water pipes, raised floors, and electrical conduit MAY be connected to building ground; therefore, provide a usable ground reference. If you are unable to locate building ground, contact your IPR for assistance.

1. Ensure that the customer branch CB is in the OFF position.
2. Perform the following voltage measurements; all voltage values should be less than 1 Vac.
 - a. Measure the voltage between the exterior shell of the customer receptacle and the building ground.
 - b. Measure the voltage between the ground pin of the customer receptacle and the building ground.
 - c. Measure the voltage between the neutral of the customer receptacle and the building ground.

Note: If the voltage values are less than 1 Vac., the customer receptacle is safe to touch.

3. Make the following resistance measurements; a reading of less than .1 ohm shows a safe and continuous grounding conductor.
 - a. Measure the resistance between the ground pin of the customer receptacle to the exterior shell.
 - b. Measure the resistance between the ground pin of the customer receptacle to the building ground.

Note: If the resistance is less than .1 ohm, the customer receptacle has a safe ground.

4. Perform the following voltage measurements of the customer receptacle; all voltage values should be less than 1 Vac.

- a. Measure the phase-to-neutral voltage.
- b. Measure the phase-to-ground voltage.
- c. Measure neutral-to-ground voltage.

Note: If voltage values are less than 1 Vac, continue.

Measuring the Customer Primary Power

DANGER

This procedure must not be performed until you have completed the following procedures.

Checking the 7171 Power Receptacle.

Checking the Customer Power Receptacle.

Do not touch the internal parts of the customer receptacle with anything except the test probes.

1. Place the customer branch CB in the ON position.
2. Perform the following voltage measurements; all voltage values should be less than 1 Vac.
 - a. Measure the voltage between the exterior shell of the customer receptacle and the building ground.
 - b. Measure the voltage between the ground pin of the customer receptacle and the exterior shell.
 - c. Measure the voltage between the neutral of the customer receptacle and the building ground.

Note: If the voltage values are less than 1 Vac, the customer receptacle is safe.

- d. Measure the phase-to-phase voltage of the customer receptacle. Continue only if the voltage values measured meet the requirements as indicated.

	Nominal	Minimum	Maximum
50/60 Hz	115	95	127
50/60 Hz	230	195	260

Power On/Off Switch

Before connecting the power cord to the power outlet receptacle, be sure the Power ON/OFF switch (see Figure 6) is in the OFF (O) position, and that the ON LINE/OFF LINE Switch is set to OFF LINE.

Connecting the Power Cord

Connect the 7171 line power cord plug to the receptacle specified in the customer generated Floor Work-Plan. **Do not connect the power cord to the wall receptacle during a lightning storm.**

Turning the Power On

Activate the Power On switch to the ON (I) position. Does the Power Indicator light? If it does not, have a qualified person check the power source (your receptacle specified in the Floor Work Plan) to determine if it is energized. If after this action, the Power On indicator does not light, go to Chapter 4 and perform the “PDP When Power Indicator Does Not Light.”

Ready Indicator On

Approximately 30 seconds after activating the Power On Switch and after the Power On Indicator lights, the Ready Indicator will light. This is an indication that the internal programmed diagnostics in the 7171 have been successfully executed.

1. If the Ready Indicator does not light after 30 seconds, it is an indication that the 7171 is not functioning correctly. When this condition occurs, go to Chapter 4 and perform the “PDP When Ready Indicator Does Not Light.”
2. If the Ready Indicator does light, turn the 7171 power off and proceed with the installation.

Connection to the Host (Installer)

The following prepares the 7171 and the host system for proper communication. It is a three part task.

Setting the Device Addresses of the 7171

The connection between each control unit is two identical cables, one cable transfers channel commands (TAG) and the other data (BUS). Each control unit is programmed to receive and transmit commands, status and data only for the devices it controls.

The first part of the connection process sets the device addresses so the 7171 knows which devices it controls. The address range defined to the 7171 must be the same as the addresses defined to the host control program and to the channel.

1. Turn the power off.
2. Locate the CA Card using Figure 5 as a reference.
3. Carefully remove the CA Card.
4. Set the device addresses on the CA Card as described in Appendix A.
5. Carefully reseal the CA Card into its position within the Card Container. Seal the CA Card into position.

Setting the Channel UCWs

The connection to the host system is through a channel which controls all input and output to the host system. Devices, such as ASCII terminals and printers, do not talk to channels directly but to control units which talk to channels. The input path is then terminal to control unit to channel. Many terminals may be connected to a single control unit and many control units may be connected to a channel. Control units are physically connected in series, one after the other, with special channel cables.

The channel knows what control units are attached to it and what devices are attached to each control unit by Unit Control Words (UCW). UCWs are defined for each channel in the host system.

1. The addresses defined in the UCW must be the same as the addresses defined in the host control program. If 32 or less addresses are defined for the 7171, the host control program must be defined as one IBM 3274-1D and one **shared block** UCW must be defined. If the 7171 contains more than 32 ports, the host control program must be defined as two IBM 3274-1D control units and two **shared block** UCWs must be defined to the channel.

Connecting the Host Channel Cables to the 7171

The third step of the connection to the host is to attach the channel cables. Refer to Figure 8 on page 26 page no..

1. Remove the two screws that hold the Channel Cable Connector Cover located on the right side in the rear of the machine.
2. Install the channel cables and replace the Channel Cable Connector Cover.
3. After the 7171 is positioned and the channel cables attached, the four EMC pads should be lowered by rotating in a clockwise direction until each sets firmly on the floor. The two caster forks are slipped under any two diagonally opposed casters in such a way as to prevent the wheels from rolling either forward or back.
4. Activate the Power On switch to the ON(I) position.
5. If the Ready Indicator does not light after 30 seconds, it is an indication that the 7171 is not functioning correctly. When this condition occurs, go to Chapter 4 and perform the "PDP When Ready Indicator Does Not Light."
6. Activate the ON-LINE/OFF-LINE mode switch to the ON-LINE position.
7. The Ready Light should remain on. If the Ready Light goes out and the card indicator lights are on, the 7171 is not communicating with the Host System properly.
 - a. Verify that the Host end of the cables are attached correctly.
 - b. Inspect the channel cables and connectors for damaged or missing pins.
 - c. If the problem persists call for assistance.
8. Switch the ON-LINE/OFF-LINE mode switch to OFF-LINE.
9. Activate the Power On switch to the OFF(O) position.
10. Have the customer install a terminal on port 0 and verify that it functions correctly with the Host System.

Figure 8 is an illustration of the back of the 7171 with the rear door opened. Familiarize yourself with the locations of the following key items:

1. Channel Cable Connectors
2. RS-232-C Communication Connector Ports
3. Power Line Cord.

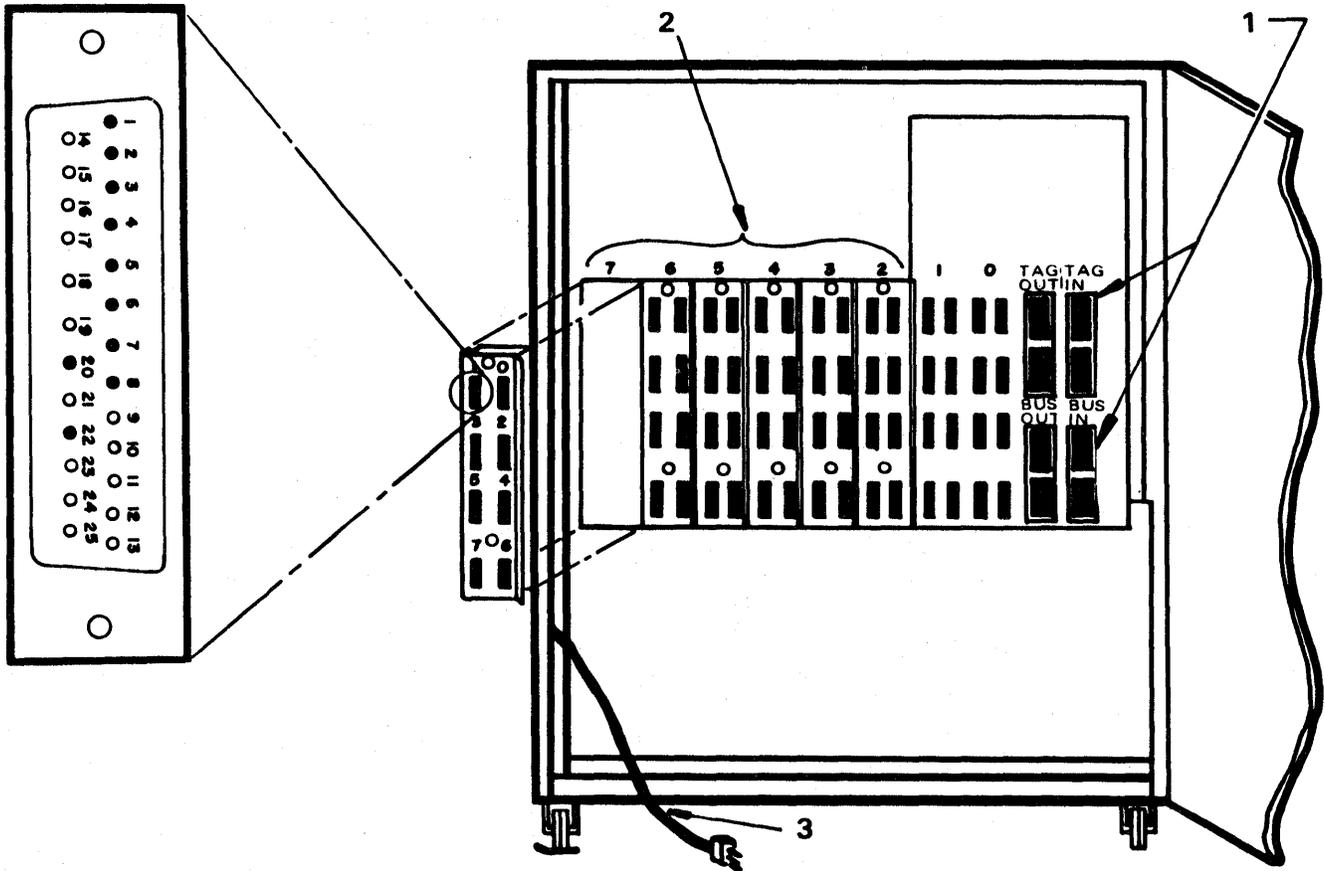


Figure 8. Illustration of the 7171 with the rear door opened

Connecting an ASCII Device to a 7171 Port (Customer)

You are now ready to perform the final installation step. Using RS-232-C communication cables that you have previously ordered, connect an ASCII terminal to a 7171 port which will function with one of the following 'default' tables, Refer to *IBM 7171 ASCII Device Attachment Control Unit Reference Manual and Programming Guide*, GA24-4020:

IBM3101	(Mfg. IBM Corporation)
ADM3A	(Mfg. Lear Siegler, Inc.)
ADM31	(Mfg. Lear Siegler, Inc.)
DM1520	(Mfg. Datamedia Corporation)
DM1521	(Mfg. Datamedia Corporation)
DM3045	(Mfg. Datamedia Corporation)
TVI912	(Mfg. Televideo Systems, Inc.)
TVI920	(Mfg. Televideo Systems, Inc.)
TVI950	(Mfg. Televideo Systems, Inc.)
VT100	(Mfg. Digital Equipment Corp.)

Insure that your terminal is set to "7 bit data" , "1 stop bit" , "even Parity" and to one of the following baud rates:

300, 600, 1200, 2400, 3600, 4800, 9600 or 19200 BPS

Activate the 7171 Power Switch ON (|).

Activate the 7171 On Line/Off Line Mode Switch to On Line.

Activate the power ON at the terminal you have connected.

Press the "Carriage Return" Key on the connected terminal.

The message "ENTER TERMINAL TYPE:" should appear on the connected terminal's screen.

Installation is now completed.

RS-232-C Port Numbering

The RS-232-C ports are referenced in two ways. The first is the octal numbering indicated on the IBM 7171 Panel Assembly units (Refer to Figure 8). These numbers correspond to RS-232-C Panel Assembly units zero through seven and to ports zero through seven on each Terminal Controller Card.

The second is the system decimal numbering of the RS-232-C ports sequentially from zero to 63. The table in Figure 9 converts the octal numbering on the back of the IBM 7171 RS-232-C Panel Assembly units to the system sequential decimal port numbering. The hexadecimal equivalent of the decimal number is also included.

Back of Unit		Sequential Number		Back of Unit		Sequential Number	
TC#	Port#	Dec	Hex	TC#	Port#	Dec	Hex
0	0	0	0	4	0	32	20
0	1	1	1	4	1	33	21
0	2	2	2	4	2	34	22
0	3	3	3	4	3	35	23
0	4	4	4	4	4	36	24
0	5	5	5	4	5	37	25
0	6	6	6	4	6	38	26
0	7	7	7	4	7	39	27
1	0	8	8	5	0	40	28
1	1	9	9	5	1	41	29
1	2	10	A	5	2	42	2A
1	3	11	B	5	3	43	2B
1	4	12	C	5	4	44	2C
1	5	13	D	5	5	45	2D
1	6	14	E	5	6	46	2E
1	7	15	F	5	7	47	2F
2	0	16	10	6	0	48	30
2	1	17	11	6	1	49	31
2	2	18	12	6	2	50	32
2	3	19	13	6	3	51	33
2	4	20	14	6	4	52	34
2	5	21	15	6	5	53	35
2	6	22	16	6	6	54	36
2	7	23	17	6	7	55	37
3	0	24	18	7	0	56	38
3	1	25	19	7	1	57	39
3	2	26	1A	7	2	58	3A
3	3	27	1B	7	3	59	3B
3	4	28	1C	7	4	60	3C
3	5	29	1D	7	5	61	3D
3	6	30	1E	7	6	62	3E
3	7	31	1F	7	7	63	3F

Figure 9. RS-232-C port numbering conversion chart

Chapter 4. Problem Determination Procedure (PDP)

The 7171 contains self-diagnostic tests that diagnose most malfunctions that occur in the IBM 7171.

It may be necessary to obtain replacement parts for those parts that are defective.

IBM recommends that IBM 7171 customers, who after the warranty period choose to service the 7171 themselves, purchase and store 'on-site', appropriate spare parts such as circuit cards, fan, power supply, and RS-232-C Panel Assembly. It is suggested that the customer order the complete complement of spare parts.

Diagnostic tests are incorporated into the power-up sequence of the IBM 7171 to verify the normal functional operation of the 7171 circuitry.

If the 7171 is operating normally, the Power Indicator on the front cover (see Figure 6 on page 18) lights immediately and the Ready Indicator lights a few seconds after the Power On (I) Switch is activated.

Use the Operator function to notify users before switching OFF-LINE or turning power off.

Power on or Power off should always be done with the ON-LINE/ OFF-LINE switch set to OFF-LINE.

After switching to OFF-LINE, wait 30 Seconds before turning Power off.

After turning Power off, wait 30 Seconds before turning Power back on.

PDP When Power Indicator Does Not Light

If the power indicator does not light, it is an indication that a malfunction exists in the 7171. If the ready indicator lights, it may mean that the power on indicator light is defective and that the 7171 is operational. If the power on light and/or card indicator lights, turn on for only an instant, proceed to Step 5 below. If neither light is on, proceed as follows:

1. With the ON-LINE/OFF-LINE switch to OFF-LINE, turn the Power Switch OFF (O), wait for at least 20 seconds and turn the Power Switch ON (I). Occasionally, the circuit breaker which is part of the Power Switch, may trip when the 7171 is initially powered on. It is reset by turning the Power Switch OFF (O).
2. With the Power Switch ON, determine by inspection whether or not the two fans located behind the power supply are running. If you cannot hear them, you may have to remove the air deflector plate above the power supply by taking out the two thumb screws that secure it to the power supply. **MAKE SURE THAT THE POWER IS OFF UNTIL AFTER YOU HAVE REMOVED THE AIR DEFLECTOR.** You can now observe the fans while you are turning power on. If one fan does not turn, replace it with POWER OFF.
3. If the fans do not turn, turn the Power Switch OFF (O) and check that the 7171 power cable is plugged into an active outlet. If so, check that the power cable inside the 7171 is plugged into the junction box located beside the fans and that the power supply is also plugged into the same box.
4. Replace the power supply and turn the Power Switch ON (I) to verify correct operation. If the spare power supply has two metallic shipping plates held in place with thumb screws on the under side, remove them before installing the supply.
5. If the power light and/or the card indicator lights turn on for only a short time when power is turned on, it is an indication that there may be a short somewhere in the 7171.
 - a. Turn the Power Switch OFF (O), unplug any half of the cards and turn the Power Switch ON (I).
 - b. If the problem persists, turn the Power Switch OFF (O), unplug the other half of the cards while reseating the first half (this assures proper power supply regulation) and turn the Power Switch ON (I).
6. If the power now stays on, turn the Power Switch OFF (O) and insert the cards one at a time, turning the Power Switch ON (I) after each card is inserted. Continue replacing one card at a time until you find the card that is causing the short, replace that card.
7. If the problem still persists, replace the power supply.
8. If you are unable to continue, invoke your Support Structure.

PDP When Ready Indicator Does Not Light

If the Ready Indicator does not light, it is an indication that a malfunction exists in the 7171. In most instances, the failure can be found by using PDP detailed below.

LEAVE THE POWER SWITCH (see Figure 6 on page 18) **ON()**.
POSITION THE ON-LINE/OFF-LINE SWITCH TO OFF-LINE.

1. If the Power indicator also did not light, see the section "PDP When Power Indicator Does Not Light."
2. Open the front door of the 7171.
3. Examine the individual cards in the Card Container and familiarize yourself with the location of the RED indicators on the individual cards. Refer to Figure 10.

Note that each card has an alphabetic group of letters marked on the surface of the part that cams the card into its slot position. A corresponding alphabetic group of letters are marked on the surface of the Card Container immediately above each card slot location (see Figure 10).

4. Match the card light patterns with the failing conditions patterns shown in Figure 11. Turn the Power Switch OFF (O). Remove the cards and replace as instructed. Insert the replacement card into the slot location of the removed card and seat firmly, using the card locking device. **AVOID EXCESSIVE FORCE!**

Note: If the failing condition (light pattern) does not match the failing conditions described in Figure 11, invoke your Support Structure.

5. Mark each card for identification, masking tape and a marking pen may be used. This is important to eliminate future mix ups with good cards.
6. The card will contain an identifying part number on a label on the component side. Obtain a replacement card with an equivalent part number.
7. Close the 7171 front door and turn the Power Switch ON ().
8. The Ready Indicator should now light.
 - a. If it does, skip to the step below for the ON-LINE/OFF-LINE switch.
 - b. If it does not, continue.
9. Turn the Power Switch OFF (O) and remove and reinsert each card.

Note: Avoid excessive force on the card! Each card type has a unique connector pattern that will not allow it to be inserted into the wrong card slot position or in the wrong orientation.

10. Activate the power switch to the ON (I) position.
11. Does the Ready Indicator light?
 - a. If the Ready Indicator lights, the problem is corrected. Go to the ON-LINE/OFF-LINE step below.
 - b. If not, invoke your Support Structure.
12. Activate the ON-LINE/OFF-LINE switch to the ON-LINE position.
13. The Ready Light should remain on. If the Ready Light goes out and all of the card indicator lights are on, the 7171 is not communicating with the Host System properly.
 - a. Verify that the Host end of the cables are attached correctly.
 - b. Inspect the channel cables and connectors for damaged or missing pins.
 - c. If the problem persists invoke your Support Structure.
14. Activate the Power On switch to the OFF(I) position.
15. PDP is completed, proceed with normal operation.

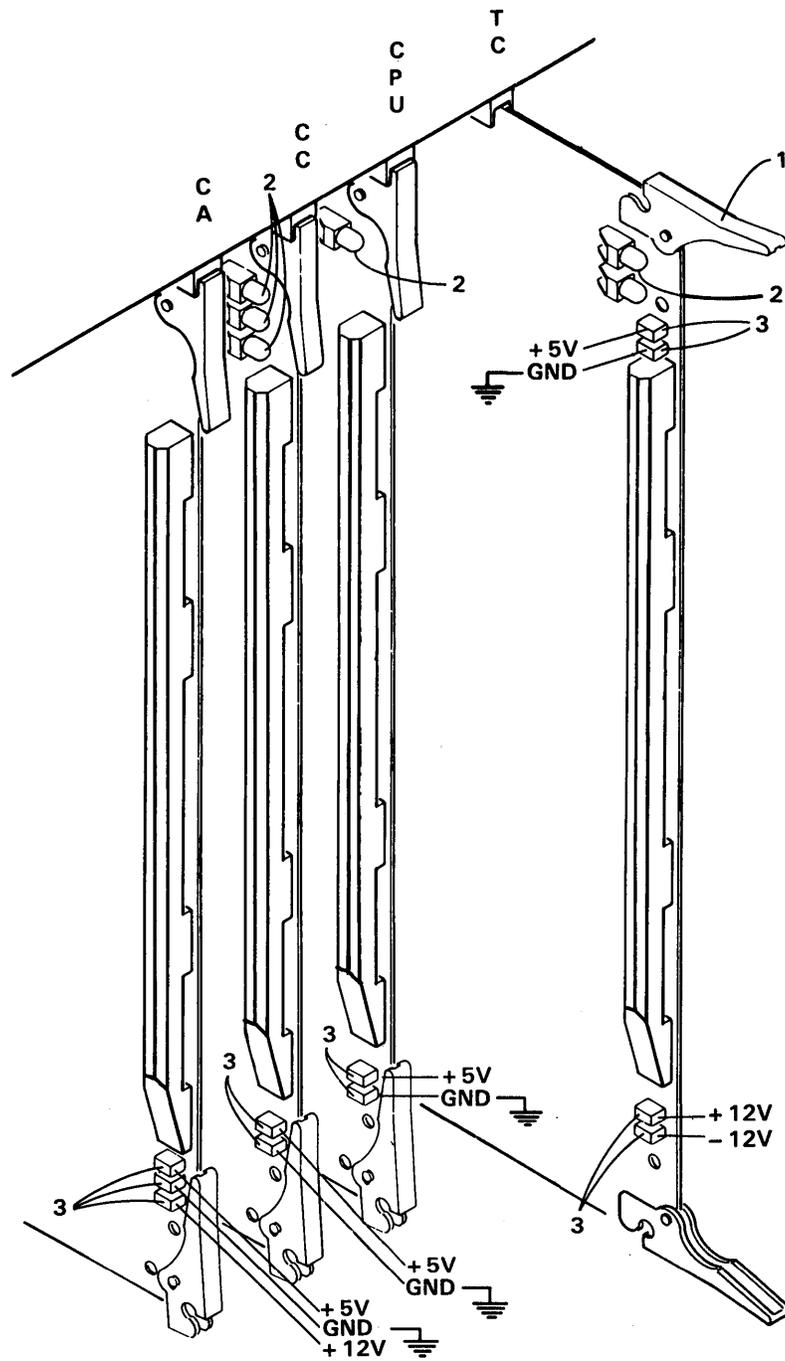


Figure 10. Card identification, error lights, and voltage test points

1. Card camming device
2. Error indicator lights
3. Voltage test points

Failing Condition #1

Card Indicator	Card Identification		
Location	CC	CPU	TC (ANY)
Top	On	Off	Off
Middle	On		Off
Bottom	On		

1. Turn power OFF
2. Replace the CC Card from spare parts.
3. Turn power ON to verify if the READY Indicator Turns ON.

Failing Condition #2

Card Indicator	Card Identification		
Location	CC	CPU	TC (ANY)
Top	Off	On	Off
Middle	On		On
Bottom	Off		

1. Turn power OFF.
2. Replace the CPU Card from spare parts.
Be sure to have the customer replace any customer defined Terminal Definition Tables.
3. Turn power ON to verify if the READY Indicator Turns ON.

Figure 11 (Part 1 of 5). IBM 7171 Card Replacement Indicator Patterns

Failing Condition #3

Card Indicator	Card Identification		
Location	CC	CPU	TC (ANY)
Top	Off	Off	On
Middle	Off		On
Bottom	Off		

1. Turn power OFF.
2. Replace the TC Card from spare parts.
3. Turn power ON to verify if the READY Indicator Turns ON.

Note: If a replacement TC Card is not available, remove the defective card. The 7171 will function correctly except for the terminals that are attached to the missing card position.

Failing Condition #4

Card Indicator	Card Identification		
Location	CC	CPU	TC (ANY)
Top	Off	Off	Off
Middle	On		Off
Bottom	Off		

1. Turn power OFF.
2. Replace the CPU Card from spare parts.
Be sure to have the customer replace any customer defined Terminal Definition Tables.
3. Turn power ON to verify if the READY Indicator turns ON.
4. If not, remove the CPU Card from the Card Container, put it back in the spare parts location, plug the original CPU Card into the Card Container.
5. Replace the CC Card from spare parts.
6. Turn power ON to verify if the READY Indicator turns ON.

Figure 11 (Part 2 of 5). IBM 7171 Card Replacement Indicator Patterns

Failing Condition #5

Card Indicator Location	Card Identification		
	CC	CPU	TC (ANY)
Top	Off	Off	Off
Middle	Off		Off
Bottom	On		

1. Turn power OFF.
2. Replace the CA Card from spare parts.
Be sure to set the channel addresses as described in Appendix A.
3. Turn power ON to verify if the READY Indicator Turns ON.
4. If not, remove the CA Card from the Card Container, put it back in the spare parts location, plug the original CA Card into the Card Container.
5. Replace the CC Card from spare parts.
6. Turn power ON to verify if the READY Indicator Turns On.

Figure 11 (Part 3 of 5). IBM 7171 Card Replacement Indicator Patterns

Failing Condition #6

Card Indicator Location	Card Identification		
	CC	CPU	TC (ANY)
Top	Off	Off	Off
Middle	Off		On
Bottom	Off		

1. Turn power OFF.
2. Replace the CPU Card from spare parts.
Be sure to have the customer replace any customer defined Terminal Definition Tables.
3. Turn power ON to verify if the READY Indicator Turns ON.
4. If not, remove the CPU Card from the Card Container, put it back in the spare parts location, plug the original CPU Card into the Card Container.
5. Replace the TC Card from spare parts.
6. Turn power ON to verify if the READY Indicator Turns On.

Note: If a replacement TC Card is not available, remove the defective card. The 7171 will function correctly except for the terminals that are attached to the missing card position.

Failing Condition #7

Card Indicator Location	Card Identification		
	CC	CPU	TC (ALL)
Top	Off	Off	Off
Middle	On		On
Bottom	Off		

1. Replace the CPU Card.
Be sure to have the customer replace any customer defined Terminal Definition Tables.
2. Turn power ON to verify if the READY Indicator Turns ON.

Figure 11 (Part 4 of 5). IBM 7171 Card Replacement Indicator Patterns

Failing Condition #8

Card Indicator Location	Card Identification		
	CC	CPU	TC (ALL)
Top	On	On	On
Middle	On		On
Bottom	On		

1. Verify that the 7171 and Host ends of the channel cables are attached correctly.
2. Inspect the channel cables and connectors for damaged or missing pins.
3. If the problem persists invoke your Support Structure.

Figure 11 (Part 5 of 5). IBM 7171 Card Replacement Indicator Patterns

For any other failing patterns, record the pattern and invoke your Support Structure.

PDP for 7171 Intermittent Operating Errors

Intermittent problems in the 7171 can occur for a number of reasons. The most common causes are:

- Insufficient cooling
- Loose cable connectors
- Loose circuit cards
- Marginal power supply.

The following steps are suggested to help solve intermittent system errors in operation that can be attributed to the 7171 unit.

Turn the **ONLINE/OFFLINE** switch to the **OFFLINE** position when performing any of the following steps. Refer to Figure 6.

Step 1

1. Turn the Power Switch OFF(O).
2. Remove the Fan Deflector Cover Fasteners and Plate.
3. Turn the Power Switch ON(I).
4. Verify that the fan(s) are turning.
5. If the fans are turning proceed to step 2.
6. If the fan(s) are not turning, turn the Power Switch OFF(O).
7. Remove and reinsert the fan connectors in the rear of the power supply.
8. Turn the Power Switch ON(I).
9. Verify that the fan(s) are turning.
10. If the fan(s) are not turning, turn the Power Switch OFF(O).
11. Obtain replacement fan(s) and replace the defective fan(s) with new fan(s). Mark the defective parts to identify its status.
12. Turn the Power Switch ON(I).
13. Verify that the fan(s) are turning.
14. If the fan(s) are not turning, proceed to step 4.
15. If the fans are turning, turn the Power Switch OFF(O).

16. Replace the Fan Deflector Cover Fasteners and Plate.
17. Turn the Power Switch ON().
18. Return 7171 to normal operation by turning the **ONLINE/OFFLINE** switch to **ONLINE**.

Step 2

If a common problem is experienced with all ASCII devices associated with ports 16 or higher:

1. Turn the Power Switch OFF(O).
2. Remove the TC Cards TC0,TC1,andTC2. Refer to Figure 5.
3. Reseat the two crossover cables located in the rear of the Card Container.
4. Replace the TC Cards. Be certain that they are seated firmly.
5. Turn the Power Switch to ON().
6. Verify that the intermittent problem is resolved.
7. If problem is not resolved continue with step 3.
8. If problem is resolved return 7171 to normal operation by turning the **ONLINE/OFFLINE** switch to **ONLINE**.

Step 3

1. Turn the Power Switch OFF(O).
2. Reseat each circuit card, in the Card Container, one at a time.
3. Turn the Power Switch to ON()
4. Verify that the intermittent problem is resolved.
5. If problem is not resolved continue with step 4.
6. If problem is resolved return 7171 to normal operation by turning the **ONLINE/OFFLINE** switch to **ONLINE**.

Step 4

There are presently two methods available to servicing personnel that may be utilized to determine if the 7171 power supply is a potential cause of 7171 intermittent operating errors.

Method #1 involves using a voltmeter to measure the dc output voltage levels of the power supply to determine if it is operational, and if the output voltage levels that it is supplying are within an operational tolerance range.

Method #2 will be used if a voltmeter is not available.

Implementing Method #1

CAUTION

This test will be conducted with the Power Switch ON(). Please remove all jewelry from your hands and arms when performing this test.

ATTENTION The dc voltmeter used to measure the voltages should have an internal movement resistance of at least 20,000 ohms/volt to prevent damage to the 7171 and to provide an accurate voltage level reading.

Open the 7171 front cover and observe the visible end of any inserted TC card.

Located on the upper and lower portion of the visible TC card end are two pairs of plastic coated voltage probe test points. From the top of the card to the bottom of the card they are labeled TP1, TP2 and TP3, TP4. TP1 connects to +5 volts, TP2 to ground, TP3 to +12 volts, and TP4 connects to -12 volts.

Set your voltmeter to the proper scale, select the proper polarity for the voltmeter probe points and proceed to measure the respective voltages.

If the power supply voltage measure outside of the voltage tolerance range, proceed with Method #2.

Acceptable Power Supply Voltage Level Tolerance Range

1. +5 volts ----- +4.75 volts to +5.25 volts
2. +12 volts ----- +10.8 volts to +13.2 volts
3. -12 volts ----- -10.8 volts to -13.2 volts

Implementing Method #2

CAUTION

Turn the Power Switch OFF(O) and REMOVE THE LINE CORD FROM THE POWER OUTLET RECEPTACLE.

1. Remove the fan plugs and the dc power cable from the power supply.
Remove the power supply cord from the Line Junction Box.
2. Remove the power supply and replace with a new one. If the new power supply has two metallic shipping plates held in place with thumb screws on the under side, remove them before installing the supply.
3. Insert the fan cables and the dc power cable into the power supply.
Insert the power supply cable into the Line Junction Box.
4. Insert the Line Cord into the power outlet.
5. Turn the Power Switch to ON(I).
6. Verify that the intermittent problem is resolved.
7. If problem is not resolved, invoke your Support Structure.
8. If problem is resolved return 7171 to normal operation by turning the **ONLINE/OFFLINE** switch to **ONLINE**.

PDP for Network Problem Determination

If attached devices are not functioning properly, perform the following procedures before invoking your Support Structure. Establish that there is a communicating link from the 7171 to the attached devices.

1. Is only a single ASCII Device failing?
 - a. Are all switches on the ASCII Device at the proper setting? Do they match the Terminal Definition Table being used? Is the communication cable wired correctly?
 - b. Is there a good connection between the failing device and the RS-232-C port to which it may be locally attached? If the device is remotely attached to the 7171, check all cables in the communication link. Determine that the associated modems are operational and properly configured.
 - c. Is the device associated with a customer defined Terminal Definition Table? Is the table defined correctly? Has the table been recently modified? Has the CPU card been replaced recently and the customer defined tables not been updated?
2. Are the devices failing to operate all related to ports associated with a particular TC Card (see Figure 9 on page 28)?
 - a. Turn the power OFF at the 7171 unit and reseal the TC Card that is suspect. Turn the power back ON at the 7171 and verify that the problem has been corrected.
 - b. If not, Turn the power off at the 7171, obtain a replacement TC Card and replace the suspect TC Card. Turn the power back ON at the 7171 and verify if the problem has been eliminated.
3. Is the problem associated with all devices associated with port 16 and higher?
 - a. Turn the Power Switch OFF.
 - b. Remove the TC Cards TC0,TC1,and TC2.
 - c. Reseat the two crossover cables located in the rear of the Card Container.
 - d. Reinstall the TC Cards. Be certain that they are seated firmly.
 - e. Turn the Power Switch to ON.

4. Do all of the attached devices fail to respond?
 - a. Turn the power OFF at the 7171 unit and reseal the CPU Card. Turn the power back ON at the 7171 and verify that the problem has been corrected.
 - b. If not, Turn the power off at the 7171 and replace the CPU card. Be sure to have the customer replace any customer defined Terminal Definition Tables. Turn the power back ON at the 7171 and verify if the problem has been eliminated.
5. If the problem can not be solved, invoke your Support Structure.

PDP for System Problem Determination

If the Ready Indicator is on, the unit is On-Line, the 7171 appears operational but is unable to communicate with the host, establish that there is a communicating link from the 7171 back to the host processor.

1. Is the Host Processor operational? Is the Host Processor functioning with the proper operating system?
2. Are other control units having difficulty communicating with the host?
3. Turn power OFF at the 7171. Remove the CA card and verify that addresses are set correctly. Do they match the host control program? Do they match the channel defined UCWs? Reinstall the CA Card and turn power back ON.
4. If the problem still appears to be in this communicating link, turn the power OFF at the 7171 and replace the CA card. Be sure to set the channel addresses as described in Appendix A.
5. Has any machine room activity disturbed the channel cables? Are the channel cables to the 7171 unit making a good electrical connection?
6. If the problem can not be solved, invoke your Support Structure.

Chapter 5. Using ASCII Display Terminals on the IBM 7171

This chapter is directed primarily at ASCII terminal users. It gives an overview of the 3270 emulated and extended functions supported by the IBM 7171.

This chapter assumes that you are familiar with the functions of a 3270 terminal. If this is not the case, the full complement of IBM 3270 Information Display System machines is identified in the introductory publication *An Introduction to the IBM 3270 Information Display System*, GA27-2739.

IBM 3270 Emulated and Extended Functions

The IBM 7171 not only emulates a 3270 terminal for its attached ASCII terminals, in some cases it extends these functions to make interactive text and program editing more effective.

Different Character Representation

There are two important EBCDIC characters which are not defined in ASCII and therefore usually cannot be found on the keyboard of an ASCII terminal:

- the "cent" symbol (¢) and
- the "not" symbol (¬)

Since these symbols can be important in certain program languages and editors, the IBM 7171 represents them with two less important ASCII characters:

- the "backslash" (\) is used for the "cent" (¢)
- the "circumflex accent" (^) is used for the "not" (¬)

Thus, the "backslash" (\) key and the "circumflex accent" (^) key on an ASCII terminal with the IBM 7171 are to be used to type in the "cent" (¢) and the "not" symbol(¬). Note, however, that the "cent" (¢) and the "not" symbol(¬) appear on an ASCII terminal screen as "backslash" (\) and "circumflex accent" (^). Nevertheless, the hexadecimal notation of what appears as "backslash" (\) is X'4A', which is the EBCDIC code for the "cent" (¢), and of what appears as "circumflex accent" (^) is X'5F', which is the EBCDIC code for the "not" (¬).

These are the character representations contained in the 7171 supplied default translation tables. If these defaults are not acceptable, they may be modified. Please refer to the *IBM 7171 ASCII Device Attachment Control Unit Reference Manual and Programming Guide*, (GA24-4020) Chapter 4 for modification procedures.

Type-Ahead Capability

The 3270 hardware has a “keyboard lock” function which prevents you from entering data before the application program is ready to receive it. In contrast, the IBM 7171 does not lock the keyboard of an ASCII terminal. It knows when the keyboard of a real 3270 would be locked and does not process your input until it receives an “unlock” message from the host. This is because ASCII terminals are connected through full-duplex asynchronous interface hardware, whereas 3270 terminals operate in half-duplex mode.

To indicate to you that the keyboard is logically locked, the cursor is moved to the lower right corner of the screen. In this mode, up to 64 characters of user input are held by the IBM 7171 in a “type-ahead” buffer. The characters that you type do not appear on the screen because it has not yet been determined where they are to be placed. Since it is possible to type-ahead with any key, including, for example, ENTER and PFKs, it is quite possible that you are typing information which is logically associated with a screen image that the host computer has not yet written. When the host unlocks the keyboard, all the typed-ahead data appears on the screen wherever the host directed it should be placed. The resulting effect is identical to that which would have occurred if you had simply waited for the host to unlock the keyboard and only then typed in the same information.

It is possible to type-ahead multiple ENTER and PFKs, but each such key when processed by the IBM 7171 logically re-locks the keyboard and requires another host reaction and another unlock request before the data following it is processed.

Highlighted Fields

Two types of highlighting are supported:

1. Highlighted fields are supported on terminals that allow individual characters to be highlighted, but which have no true attribute bytes. An example is the DEC VT-100 terminal, which supports the ANSI X3.64 standard for Set Graphic Rendition with parameter “1.” The terminal definition table for the DEC VT-100 that is included in the IBM 7171 provides this capability.
2. Highlighting is also supported on terminals that accept attribute bytes which govern the display of characters following them up to the next attribute byte. Terminals which accept attribute bytes, but which revert to some default display mode at the end of a line, are not supported.

Some terminals (e.g. Televideo 950) can handle both the former (“mode”) and the latter (“attribute”) highlighting. The two methods cannot be mixed within the same terminal definition table.

Color Terminals

Color terminals which operate in ANSI or similar modes can be defined to emulate IBM 3279 “basic color.” “Basic color” mode means that four different colors are assigned to the unprotected unhighlighted, unprotected highlighted, protected unhighlighted, and protected highlighted fields. Selection of colors is table-driven and must be coded in the terminal definition table of the terminal. A keyboard sequence allows switching between alternate color selections, or between simple intensity highlighting and four-color modes. In this way, colors need only be used when they are helpful.

Setup Functions

Most of the extended functions can be initialized by the ASCII terminal user through **Setup Functions**. The setup function can be executed from the user terminal by a predefined key-sequence.

Normally, the setup functions are defined in pairs; one setup function initiates the function and the other resets it to the previous or default definition. This previous definition may represent a standard 3270 function, a function defined within the IBM 7171, or one determined by the user.

The function initiated by a setup function normally remains in effect until the corresponding reset setup function is issued. Some setup functions are executed by control keys defined for this purpose.

The following setup functions are available with the IBM 7171 and are described in detail in the *IBM 7171 ASCII Device Attachment Control Unit Reference Manual and Programming Guide* (GA24-4020) Chapter 2.

- Set Column Tab/Delete Column Tab
- Set Left Margin
- Set Home Line
- Delete all Column Tabs, and Reset Home Line and Left Margin
- Improved Null Processing/3270 Null Processing
- Zones Mode on/Zones Mode off
- Reverse/Restore Enter/Newline Keys
- Reverse/Restore Column and Field Tab Keys
- Alpha in Numeric-Only Field
- 3270 Numeric Fields
- 3278 Insert Mode/3277 Insert Mode
- APL Mode on/APL Mode off
- ASCII Input in APL Mode
- Primary/Alternate Display of Attributes
- Suppress Pacing/Restore Pacing
- Keyboard initiated Line Drop
- Return to ENTER TERMINAL TYPE Message
- Primary/Alternate Keyboard Arrangement

Appendix A. Setup of Addressing in the 7171

The block of addresses to be used to address the attached ASCII devices must be manually set in the 7171. These addresses must be the same as the 3270 addresses specified in the Host System Control Program and in the channel configuration. Contact your system programmer and ask for the first and last address generated for the 7171.

A switch assembly with eight on-off switches is provided for this purpose. The first four switches define the first address and the last four define the last address. The switch assembly is located near and slightly below the center of the CA card. Markings on the switch assembly indicate the On and Off positions.

The switch settings establish the first and last addresses of the block of 16, 32, 48 or 64 addresses that will be used to address terminals attached to the 7171 ports. If the number of ports to be supported does not exactly match one of these block sizes, the next larger block size should be used.

To define the block of addresses to be used, the first and last addresses are specified as follows:

- **FIRST ADDRESS:**
 - If number of devices (ports) supported by the 7171 is 16 or less, the first address can be on any hex 10 boundary (00, 10, 20, ...F0).
 - If number of devices (ports) supported by the 7171 is more than 16, the first address must even hex boundaries (00, 20, 40, ...E0).
- **LAST ADDRESS:** The last address depends on the starting address and the number of attached devices.

When the addresses to be used have been determined, the CA card should be pulled and the switches set according to the following tables. The first table lists all the valid combinations of first and last addresses. The next table shows the switch settings for the valid addresses. Locate the first address in Figure 12 and determine the valid last address based on the number of attached devices. Use Figure 13 to convert these addresses to switch settings.

First Address	Valid Last Addresses			
	16	32	48	64
00	0F	1F	2F	3F
10	1F			
20	2F	3F	4F	5F
30	3F			
40	4F	5F	6F	7F
50	5F			
60	6F	7F	8F	9F
70	7F			
80	8F	9F	AF	BF
90	9F			
A0	AF	BF	CF	DF
B0	BF			
C0	CF	DF	EF	FF
D0	DF			
E0	EF	FF		
F0	FF			

Figure 12. Valid 7171 Addresses

First Address	Switch Position				Last Address	Switch Position			
	1	2	3	4		5	6	7	8
00	0	0	0	0	0F	0	0	0	0
10	0	0	0	1	1F	0	0	0	1
20	0	0	1	0	2F	0	0	1	0
30	0	0	1	1	3F	0	0	1	1
40	0	1	0	0	4F	0	1	0	0
50	0	1	0	1	5F	0	1	0	1
60	0	1	1	0	6F	0	1	1	0
70	0	1	1	1	7F	0	1	1	1
80	1	0	0	0	8F	1	0	0	0
90	1	0	0	1	9F	1	0	0	1
A0	1	0	1	0	AF	1	0	1	0
B0	1	0	1	1	BF	1	0	1	1
C0	1	1	0	0	CF	1	1	0	0
D0	1	1	0	1	DF	1	1	0	1
E0	1	1	1	0	EF	1	1	1	0
F0	1	1	1	1	FF	1	1	1	1

0 is off (open)
1 is on (closed)

Figure 13. Valid Switch Settings

Appendix B. Communication Interface

This appendix describes the operation, connector specifications, line definition, and electrical specifications of the EIA/CCITT interfaces.

EIA/CCITT Operation

The EIA/CCITT interface has two designations: EIA RS-232-C and CCITT V.24/V.28. Each designation identifies a communication interface standard (EIA RS-232-C) or a recommendation (CCITT V.24/V.28). The designation depends upon the country in which the 7171 is located.

The EIA RS-232-C designation is used only in the U.S.A. and Canada. The CCITT V.24/V.28 designation is used elsewhere.

The EIA/CCITT interface provides drivers and receivers that have the electrical characteristics required by the EIA standard and by the CCITT recommendations.

Line Definitions

The EIA/CCITT interface lines are defined by the EIA standard RS-232-C, and CCITT recommendations V.24. For detailed information on the EIA/CCITT interface lines, refer to the following publications:

Electronics Industries Association (EIA) Standards (RS-232-C)

CCITT, Data Communication over the Telephone Network, Yellow Book, Volume VIII.1 for recommendation V.24

Interface Connector Pinning

A 25-pin connector with pins arranged as shown in Figure 14 is the most widely used connector for EIA RS-232-C and Recommendation V.28 interfaces. International Organization for Standardization (ISO 2110) states that a male connector is used on Data Terminal Equipment and a female connector is used on the Data Circuit-Terminating (Communications) Equipment. However this standard is not strictly adhered to by industry. The IBM 7171 is classified as Data Terminal Equipment and its output ports are 25-pin male connectors.

Only those pins used on the face of the connector illustrated in Figure 14 are connected internally to the 7171 circuitry boards.

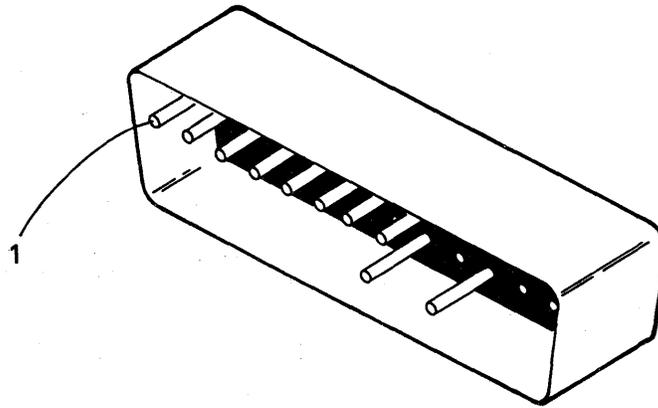


Figure 14. View of Face of Connector

1. Pins used are shown (male)

For additional information see "Data Communication - 25-pin DTE/DCE Interface Connector and Pin Assignments," (ISO) International Organization for Standardization (ISO).

RS-232-C Connector Pin Assignments for the IBM 7171 Output Ports

Figure 15, shows the port interface lines used by the IBM 7171. When there is a difference between EIA and the CCITT nomenclature, that of the CCITT is shown in parentheses.

Connector Pin No.	Designation EIA	Designation CCITT	Name	Function
1	AA	101	Protective Ground (Not Defined)	Ground
2	BA	103	Transmitted Data	Data
3	BB	104	Received Data	Data
4	CA	105	Request to Send	Control
5	CB	106	Clear to Send (Ready for Sending)	Control
6	CC	107	Data Set Ready	Control
7	AB	102	Signal Ground	Ground
8	CF	109	Receive Line Signal Detector * (Data Channel Received Line Signal Detector)	Control
20	CD	108.2	Data Terminal Ready	Control
22	CE	125	Ring Indicator (Calling Indicator)	Control

Figure 15. Port interface lines used by the IBM 7171 Male RS-232-C Connector

* This line is sometimes called the common name 'Carrier Detect' or 'RLSD'.

RS-232-C Cable Wiring Diagrams

7171 End	Cable Interface	Terminal End
Protective Ground	1-----1	Protective Ground
Received Data	3<-----2	Transmitted Data
Transmitted Data	2----->3	Received Data
Signal Ground	7---*-----7	Signal Ground
Ring Indicator	22--* 7	
Data Carrier Detected	8<-----*---4 *-->5	Request to Send Clear to Send
Data Set Ready	6<---*----->6	Data Set Ready
Data Terminal Ready	20--*	
Request to Send	4---*----->8	Data Carrier Detected
Clear to Send	5<---*	

Figure 16. Cable wiring diagram for directly attached supported terminal

Note: At the 7171 end of the cable, pin 22 (Ring Indicator) must be tied to pin 7 (Signal Ground), or the automatic line configuration option must be set to local. See *IBM 7171 ASCII Device Attachment Control Unit Reference Manual and Programming Guide*, GA24-4020, "Chapter 9. Configure Command" for details.

7171 End	Cable Interface	Terminal End
Protective Ground	1-----1	Protective Ground
Received Data	3<-----2	Transmitted Data
Transmitted Data	2----->3	Received Data
Signal Ground	7---*-----7	Signal Ground
Ring Indicator	22--* 	
Data Carrier Detected	8<-----*---4 *-->5	Request to Send Clear to Send
Data Set Ready	6<--*----->6	Data Set Ready
Data Terminal Ready	20--* 	
Request to Send	4----->8	Data Carrier Detected
Clear to Send	5<-----20	Data Terminal Ready

Figure 17. Cable wiring diagram for any directly attached ASCII device requiring operator intervention, such as printers and plotters

Note: At the 7171 end of the cable, pin 22 (Ring Indicator) must be tied to pin 7 (Signal Ground), or the automatic line configuration option must be set to local. See *IBM 7171 ASCII Device Attachment Control Unit Reference Manual and Programming Guide*, GA24-4020, "Chapter 9. Configure Command" for details.

7171 End	Cable Interface	Terminal End
Protective Ground	1-----1	Protective Ground
Transmitted Data	2-----2	Transmitted Data
Received Data	3-----3	Received Data
Request to Send	4-----4	Request to Send
Clear to Send	5-----5	Clear to Send
Data Set Ready	6-----6	Data Set Ready
Signal Ground	7-----7	Signal Ground
Data Carrier Detected	8-----8	Data Carrier Detected
Data Terminal Ready	20-----20	Data Terminal Ready

Figure 18. Cable wiring diagram for EIA modem leased line configuration

Note: If the attached modem does not drive pin 22 (Ring Indicator), then pin 22 and pin 7 (Signal Ground) must be tied together at the 7171 end of the cable, or the automatic line configuration option must be set to leased. See *IBM 7171 ASCII Device Attachment Control Unit Reference Manual and Programming Guide*, GA24-4020, "Chapter 9. Configure Command," for details.

7171 End	Cable Interface	Terminal End
Protective Ground	1-----1	Protective Ground
Transmitted Data	2-----2	Transmitted Data
Received Data	3-----3	Received Data
Request to Send	4-----4	Request to Send
Clear to Send	5-----5	Clear to Send
Data Set Ready	6-----6	Data Set Ready
Signal Ground	7-----7	Signal Ground
Data Carrier Detected	8-----8	Data Carrier Detected
Data Terminal Ready	20-----20	Data Terminal Ready
Ring Indicator	22-----22	Ring Indicator

Figure 19. Cable wiring diagram for EIA modem switched network configuration

Appendix C. IBM 7171 Safety Checklist

SAFETY BULLETIN

Attention: Service Personnel

Before powering up the IBM 7171 ensure that there is a continuous ground path of less than 0.1 ohm resistance from the ground pin of the line power plug connector to the frame of the 7171.

Verify that Hazardous Area warning labels are in place on the Line Junction Box and Power Supply. Figure 5 shows the location and wording of these labels.

The IBM 7171 is earth grounded in the following manner:

1. The path begins with the ground pin located in the 7171 AC power line cord plug. The path continues to the corresponding ground pin position on the opposite end of the line cord.
2. The line cord receptacle end plugs into an appliance coupler connector located in the top of the 7171 line power junction box. The ground pin of this mating connector is internally wired in the junction box directly to the 7171 frame via accepted bonding practices, i.e., nut and bolt, and external star washers. A protective grounding symbol (IEC417, symbol 5019) is inside the junction box.
3. The 7171 line power junction box also contains an appliance coupler located in the top of the box that provides power through a power line cord to the 7171 power supply. The ground pin of this mating connector is also internally wired in the junction box directly to the 7171 frame via an individual 'nut and bolt' bond.
4. The 7171 power supply is connected to the power junction box by its power cord. The power supply power cord ground wire is connected directly to the chassis of the 7171 power supply. The power supply has an additional ground path to the frame via the four removable threaded fasteners.
5. The 7171 power supply provides power to each of the two cooling fans via appliance coupler located on the rear of the power supply. These power supply couplers have their ground pins internally connected directly to the chassis of the 7171 power supply.
6. The ground wire on the other end of the fan AC power line cord is bonded directly to the metal case of the fan housing. The fans are

shock mounted (insulated) from the 7171 frame to eliminate excessive vibration noise. As a result, each fan has an additional ground path from its case to the 7171 frame.

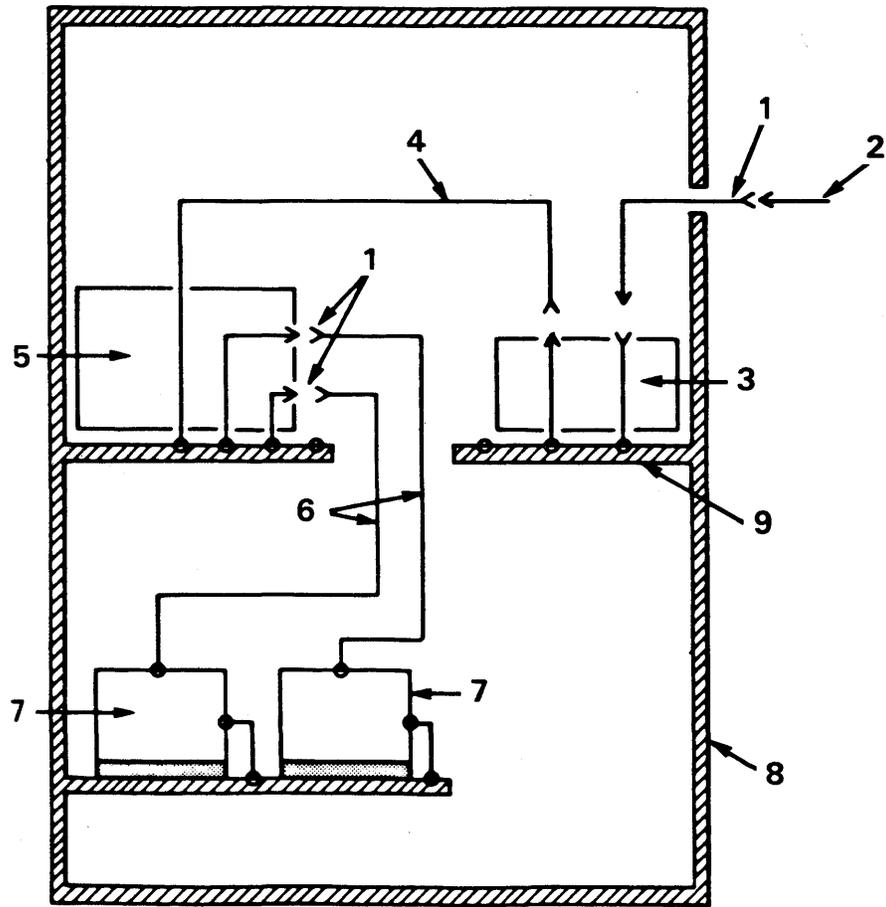


Figure 20. IBM 7171 Grounding Diagram

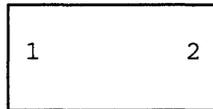
1. Power cord plug
2. Customer Power Receptacle
3. Line power junction box and cover
4. Power supply cable
5. Power supply chassis
6. Fan power cables
7. Fan case
8. Frame ground
9. Mechanical/Electrical ground bond (typical)

Appendix D. IBM 7171 Channel Cabling Schematic

CABLE
GROUP

ID ID

3920 Signal Cables <-----
(BUS & TAG)



<----- Signal Cables
(BUS & TAG)

From 7171

Group No.	No. of Cables	Conn. ID	Max. Length m (ft)	Comments	Notes
3920	2	1	58.7 195	BUS & TAG	1,2

To 7171

Conn. ID	Comments
2	BUS & TAG

Notes:

1. *Maximum cable length, end to end, not to exceed 61 meters (200 feet).*
2. *Power Sequence and Control Cable not required.*

Glossary

acoustic coupler. A type of data communication equipment that permits use of a telephone handset as a connection to a telephone network for data transmission by means of sound transducers.

ANSI. American National Standards Institute.

APL. A Programming Language.

ASCII. American National Standard Code for Information Exchange.

ASCII Devices. Devices that respond to commands and data supplied in the ASCII format and in turn respond with ASCII.

asynchronous. Without regular time relationship; unexpected or unpredictable with respect to the execution of a programs instructions.

asynchronous communications adapter. A device that permits communication on a cable attached to an RS-232 interface.

autobaud. Automatic baud rate recognition.

AWG. American Wire Gauge - a system used for specifying the size of wire.

baud. in asynchronous transmission, the unit of modulation rate corresponding to one unit interval per second, i.e.,if the duration of the unit interval is 20 milliseconds, the modulation rate is 50 baud.

BPS. Bits Per Second (see Baud).

branch circuit. The electrical power distribution system within a building or structure, usually incorporating protective devices against faults within attached wiring or devices.

BTU. Brittish Thermal Unit.

CA Card. Channel Adapter Card - The card that interfaces with the Host channel.

camming. A process that uses a cam like device (ejector) to assist in the card insertion or extraction.

CC Card. Channel Controller Card - The card that controls the CA Card and interfaces with the CPU Card.

circuit breaker (CB). A device for interrupting electric current in the event of a failure.

CCITT. See EIA/CCITT.

communication common carrier lines. Public service transmission service providing tranmission service facilities, eg., a telephone or telegraph company.

conduit. A pipe or tube for protecting electrical wires or cables.

configured. To configure a program means to enter information telling it what characteristics it is supposed to have or is supposed to support. To configure a 7171 would mean to install the necessary cards so that it could support the desired number of terminals.

Conn.. Connector.

CPU Card. The Central Processing Unit Card contains 7171 control microcode and interfaces with both the CC Card and the TC Card.

crossover cable. A cable designed to carry signals or power from one section of the device to another section, eg., between adjacent logic boards.

cursor. Movable marker used to indicate a position on a display space.

dBa. Decibels of sound using the A-weighting network.

DCE. Data Circuit terminating Equipment.

default table. See terminal default table.

diskette. A thin, flexible magnetic disk and a semi-rigid protective jacket, in which the disk is permanently enclosed, used for semi-permanent data storage.

DTE. Data Terminal Equipment.

EBCDIC. Extended binary-coded decimal interchange code. A coded character set consisting of 8-bit coded characters.

EIA/CCITT. Electronic Industries Association/International Telegraph and Telephone Consultive Committee.

electrostatic. Producing or containing static electricity.

EMC. ElectroMagnetic Compatibility.

full duplex. Simultaneous two way independent data transmission in both directions.

hexadecimal. A number system having a base of sixteen.

host system. A data processing system to which a communication system is attached and with which the system can communicate.

ID. Identification

IEC417. International Electrotechnical Commission standard number 417.

interactive. An application in which each entry calls forth a response from a system or program.

IPR. Installation Planning Representative.

ISO. International Organization for Standardization.

micropascal. micro newtons per square meter.

modem. A device that modulates and demodulates signals transmitted over data communication facilities.

NEMA. National Electrical Manufacturer's Association.

octal. A number system having a base of eight.

PDP. Problem Determination Procedures. A guided procedure for determining the cause of device or program failure.

PFK's. Program Function Keys.

polarity. When referring to a cable between two objects, connecting the output of one to the input of the other in the correct manner.

port. Refers to one of up to 64 possible RS-232-C output connectors used to attach devices to the 7171.

protector. A device for interrupting electric current in the event of a failure.

protocol. The set of rules governing the operation of functional units of a communication system that must be followed if communication is to be achieved.

RS-232-C. Electronic Industries Association recommended standard interface between data terminal equipment and communication equipment employing serial binary data interchange.

SCP. System Control Program, Programming that is considered fundamental to the operation and maintenance of a system.

shared block multiplexer channel. A multiplexer channel on which a set of devices are on the same subchannel and that interleave blocks of data.

TC Card. Terminal Control Card - Interfaces with the attached ASCII terminals and with the CPU Card.

teleprocessing (TP). Remote communications equipment.

terminal default table. Terminal definition tables that are shipped with the 7171.

terminal definition table. Attributes for supported devices resident in the 7171.

transparent output. A mode of data transmission in which data is transmitted as 7 bit ASCII characters from the host to the device.

type-ahead. The ability of a device to store an operators keystrokes allowing faster input then the device can normally accept.

UCW. Unit Control Word.

utility(program). A computer program in general support of the processes of a computer or other programmable device.

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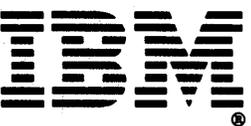
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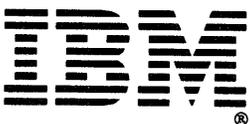
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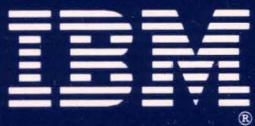
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