IBM

DISPLAYWRITER SYSTEM

Product Support Manual

SY09-1024-0

3277 Device Emulation
RPQ 8D0098
PRPQ P10034

IBM

DISPLAYWRITER SYSTEM

Product Support Manual

SY09-1024-0

3277 Device Emulation
RPQ 8D0098
PRPQ P10034

First Edition (November 1982)

IBM has prepared this maintenance manual for the use of IBM Customer Engineers in the installation, maintenance and repair of the specific machines indicated. IBM makes no representations that it is suitable for any other purpose.

Information contained in this manual is subject to change from time to time. Any such change will be reported in subsequent revisions or distributed through Customer Engineering Memorandums (CEMs) to all subscribers.

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

Requests for copies of IBM publications should be made to your IBM representative or to the IBM Branch Office servicing your locality.

A form for readers' comments is provided at the back of this publication. If the form has been removed, comments may be addressed to IBM Canada Ltd., Information Development, Department 849, 1150 Eglinton Avenue East, Don Mills, Ontario, Canada M3C 1H7. IBM may use or distribute whatever information you supply in any way it believes appropriate without incurring any obligation to you.

SAFETY PRECAUTIONS

All IBM Customer Engineers are expected to take every safety precaution possible and observe the following safety practices when servicing IBM equipment.

Mechanical Safety:

1. *Safety glasses must be worn.*
2. *All safety devices, such as guards, shields, signs, ground wires, etc., must be restored after maintenance. When a guard or shield is removed to observe or make an adjustment, that shield must be replaced when work in the area is completed.*
3. *Watches, rings, necklaces, ID bracelets, etc., must be removed when servicing the machine.*
4. *Care must be used when working near moving parts. Keep hair away from moving parts. Avoid wearing loose clothing that might be caught in the machine. Shirt sleeves must be kept buttoned or rolled above the elbows. Ties must be tucked in the shirt or have a tie clasp approximately three inches from the end. Tie chains are not recommended.*

Electrical Safety:

1. *The equipment referenced in this manual may use high voltages. Check voltage labels!*
2. *Safety glasses must be worn when checking energized circuits.*
3. *If a circuit is disconnected for servicing or parts replacement, it must be reconnected and tested before allowing the use of the machine.*
4. *Power should be removed from the machine for servicing whenever possible. Remember, when checking voltages, avoid contacting ground potential, such as metal floor strips, machine frame, etc.*
5. *Meter continuity checks should be used instead of voltage checks whenever possible.*
6. *Do not apply power to any part, component, or subassembly when it is not physically mounted in the machine.*

General Safety:

1. *Each Customer Engineer is responsible to be certain no action on his/her part makes the product unsafe or exposes customer personnel to hazards.*
2. *Store the removed machine covers in a safe, out of the way place where no one can trip over them.*
3. *If you must leave the machine in a down condition, always install the covers and disconnect the power before leaving the customer's office.*
4. *Always place CE tool kit away from walk areas where no one can trip over it.*
5. *Maintain safe conditions in the area of the machine while performing and after completing maintenance.*
6. *Before starting the equipment, make sure fellow CEs and customer personnel are not in a hazardous position.*
7. *All the machine covers must be in place before the machine is returned to the customer.*

Note: *Refer to the Safety CEMs relating to this product(s) for further safety precautions.*

PREFACE

This maintenance information manual is for the use of US and World Trade service personnel trained on the Displaywriter System. Familiarization with the 3277 Display Station is not required. Refer to other product publications if additional information is needed.

This manual should be used when the Displaywriter diagnostics indicate a 3277 device-emulation failure; otherwise, use the base Displaywriter maintenance information.

Included in this manual are descriptions, locations, removal and replacement procedures, and part locations for the 3277 Device Emulation FRUs (field-replaceable units).

CONTENTS

Figures

With the 3277 Device Emulation RPQ installed and activated, the Displaywriter can function like an IBM 3277 Model 2 Display Station simply by pressing the ENTER key while holding down the CODE key.

The IBM 3277 Model 2 is an online, interactive display station that is normally connected through a 3270 Information Display System Cluster Controller to a host system. With the 3277 Device Emulation RPQ-PRPQ, the Displaywriter becomes both a text processor and an online, interactive display station.

Maintaining the Displaywriter with 3277 device emulation is similar to servicing any other Displaywriter system; the 3277 characteristics are in function only. When the Displaywriter is emulating the 3277 Model 2, all display screens, prompts, and most messages are controlled by the host-system application program.

Prerequisites for the Displaywriter-3277 Device Emulation RPQ-PRPQ

Before the 3277 Device Emulation RPQ-PRPQ can be installed, the Displaywriter must have the following items:

- The Display Card Bright feature (EC 325950)
- A 66-line processor card (EC 863380)
- Textpack 4 or Textpack 6 with alternate task support
- Memory requirements to concurrent 3277 DE and text operation:
  - Textpack 4 – 320K bytes, or
  - Textpack 6 – 384K bytes (newly announced memory size)

  Note: For non-concurrent operation, Textpack 4 or Textpack 6 current memory requirements apply.

Restrictions when Using 3277 Device Emulation

Use of the 3277 Device Emulation RPQ requires consideration of the following items:

- The Displaywriter cannot have the Printer Sharing feature (FC 7997) installed.
- The Displaywriter must be a secondary work station or a stand-alone work station.
- The Displaywriter with 3277 device-emulation does not support *both* the 66-line display screen and the Communications feature. *Either* of these items can be used with the 3277 Device Emulation RPQ but not *both.*
- As much as 64K of storage is sometimes needed to store the 3277 Device Emulation PRPQ; this may require increased Displaywriter memory size.
- 3277 Device Emulation excludes light pen, APL ASCII character set, keyboard numeric lock, operator identification card reader, attached printer, or any special features or RPQs.

KEYBOARD TEMPLATES

Figure 1 illustrates the Displaywriter key groups. When in 3277-emulation mode, some of the keys in groups 1, 3, and 4, and the INDEX key in group 2, have different functions. Two keyboard templates include the names of the keys that emulate 3277 functions; one template fits over the group 3 and 4 keys and the other fits over the keys of group 1. Once positioned, these templates need not be removed, regardless of the Displaywriter task or mode.

Sometimes a key on the keyboard provides an additional function if it is pressed while the CODE key is being held down. Such an additional function is labeled on the front of its keybutton. When such a dual-purpose key is shown on a keyboard template, the additional function is printed in the lower half of the key name space.

Function Control Key Differences

The following are differences in key operation because of the 3277 Device Emulation RPQ-PRPQ:

- *REQST* (Request): Pressing this key causes the display of any additional operations that can be used during a task. At the completion of a requested task, the system automatically returns to the mode in which the REQST key was pressed.
- *End:* Pressing this key causes the 3277 device emulation mode to end.

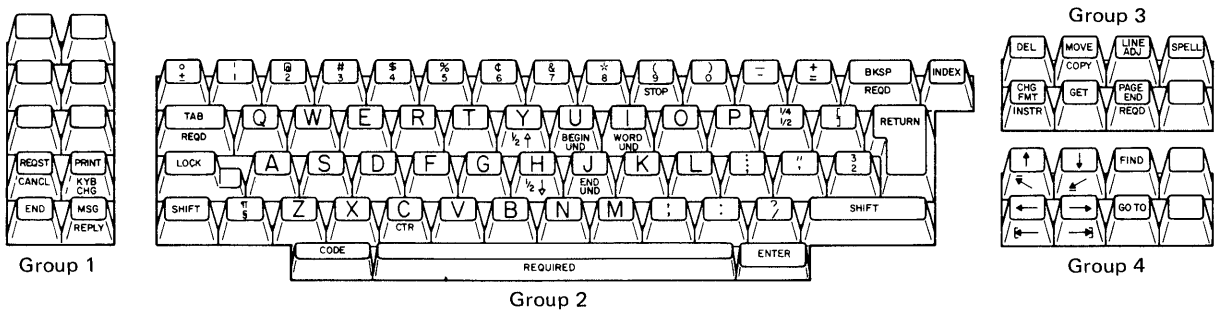


Figure 1. Displaywriter Key Groups

Displaywriter 3277-Emulation Keyboard Templates

Figure 2 and Figure 3 show the 3277 device-emulation keyboard templates. The keyboard templates are designed to fit over the outer key groups to provide labels for key functions that are not shown on the individual keytop graphics.

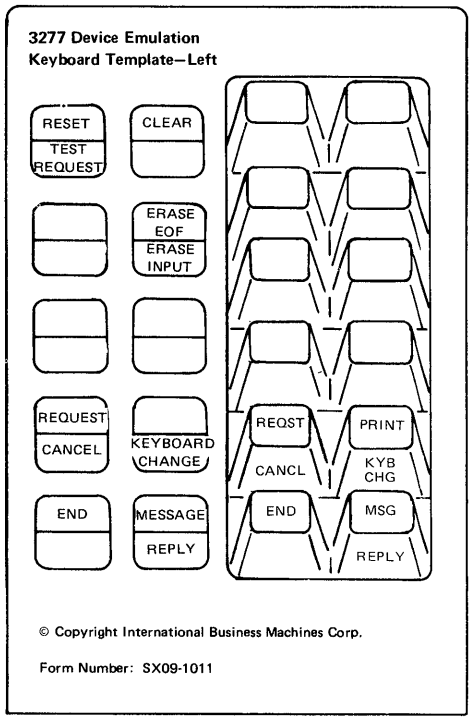


Figure 2. Group 1 Key Assignments: 3277 Emulation

Group 1 Keys: The following group-1 function key descriptions are newly added for the 3277 Device Emulation RPQ or are changes from the existing Displaywriter functions. Key assignments not described below *do not apply to the 3277 Device Emulation RPQ.*

Reset Key: Pressing the Reset key resets the INSERT MODE and INPUT INHIBITED indicators except during the short periods when the Displaywriter is sending data to, or receiving data from, the host system. It is therefore possible to press the Reset key and not accomplish the desired reset. If this happens, press the key again to reset the condition.

Test Request Key: Pressing the Test Request key causes an action determined by the programming for your system. The Test Request Key is used (1) during request-for-test (RFT) procedures or (2) during the procedure for logging-on or -off the Teleprocessing Online Test Executive Program (TOLTEP).

Clear Key: Pressing the Clear key erases every character position on the screen, establishes an unformatted display, and positions the cursor to the first location on line 1.

Erase Input Key: Pressing this key causes all input fields on the screen to be erased. The cursor moves to the first position of the first field into which data can be entered. Permanently displayed information (such as prompts) is not erased.

Erase EOF Key: Pressing the Erase EOF (erase-to-end-of-field) key causes all character positions to the end of the current field to be erased, starting at the position above the cursor. The cursor, however, does not move.

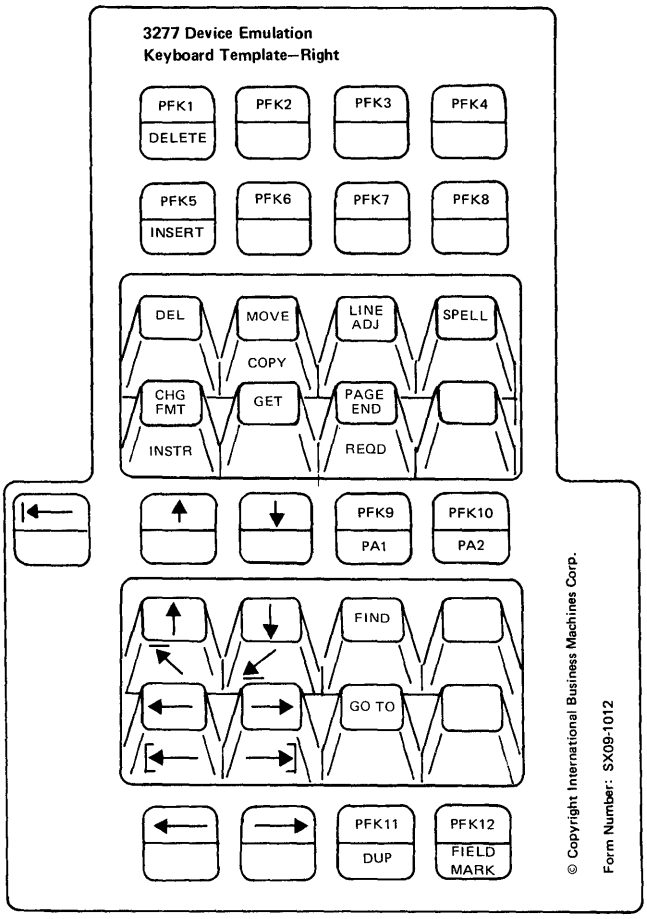


Figure 3. Groups 3 and 4 Key Assignments: 3277 Emulation

Groups 3 and 4: The following function key descriptions are newly added for the 3277 Device Emulation RPQ or are changes from the existing Displaywriter functions. Key assignments not described below *do not apply to the 3277 Device Emulation RPQ.*

Back Tab Key: Pressing the Back Tab key backspaces the cursor to the first position of the current input field. If the cursor is already located in the first position when the Back Tab key is pressed, the cursor moves to the first position of the *previous* input field.

PA1 and PA2 Keys: Pressing the PA1 or PA2 key provides the operator with a way to access or signal the system program; because of this, the exact function of these keys depends on system programming.

Program Function Keys, PF1–PF12: Pressing a PF key causes the application-program-assigned function of that PF key to be performed.

Delete Key: Pressing the Delete key when the cursor is located in an unprotected field causes the character underlined by the cursor to be deleted. All characters in the current field to the right of the deleted character move one position to the left.

Insert Key: Pressing the Insert key sets an entry mode whereby the character keyed is positioned at the current cursor location; this shifts the cursor, the existing character above the cursor, and any other characters in the field *to the right of the cursor* one position to the right. If the current input field is full, character insertion is impossible, and the operator receives an error indication.

Dup Key: Pressing the Dup key typically causes the information in the corresponding field of the previous record to be duplicated in the current record. The application program defines the action of this key.

Field Mark Key: Pressing the Field Mark key with an unformatted screen enters a nondisplayed end-of-field attribute character into the data stream. The application program defines the action of this key.

SYSTEM ELECTRONICS

The electronics module contains electronic cards connected to a distribution board (Figure 4). The functions of only the 3277-emulation card are described in this section.

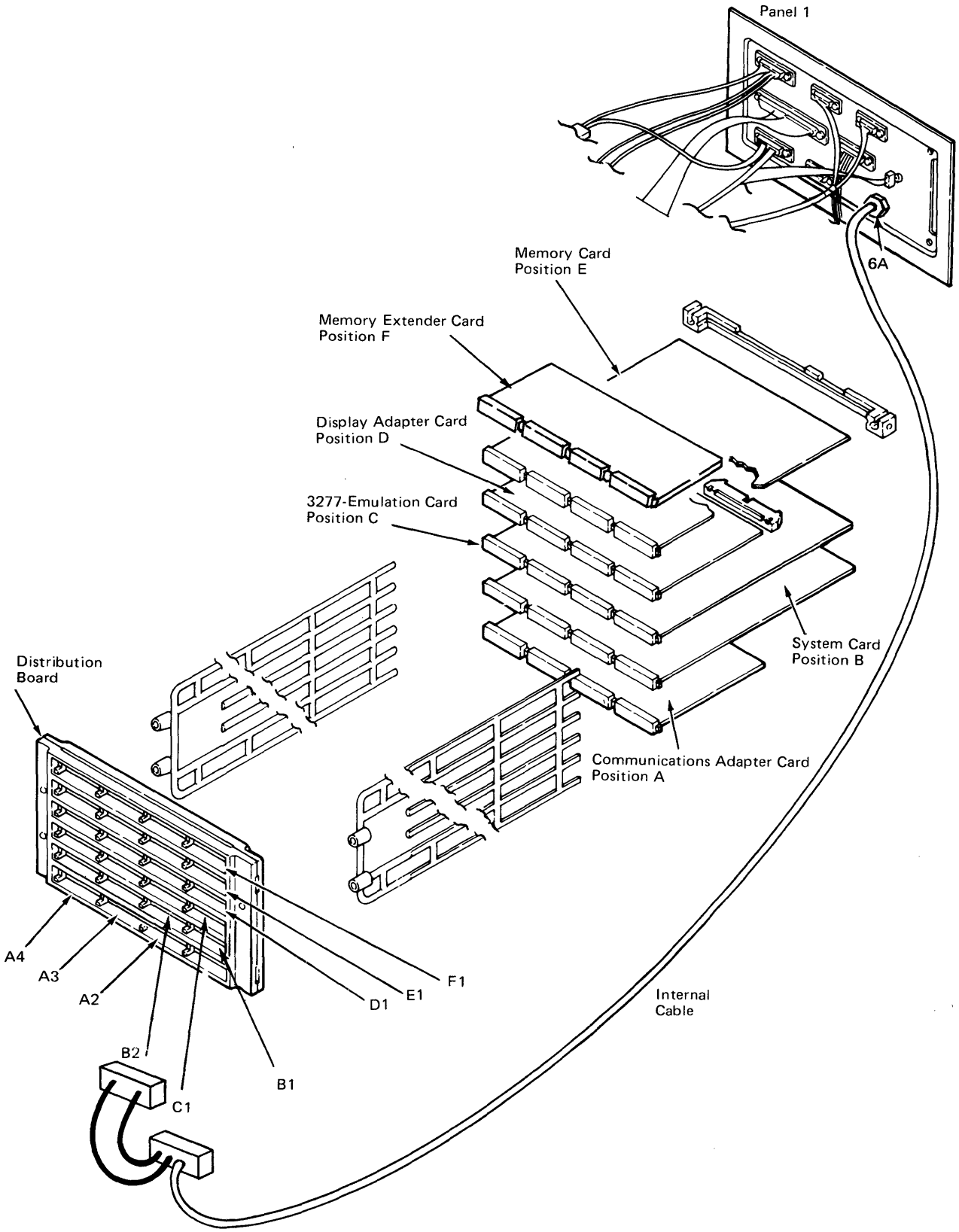


Figure 4. Displaywriter Electronics

3277-Emulation Card—Pin Assignments and Signal Descriptions

The 3277-emulation card is a 4-wide-by-6-high card assembly located in position C (the printer-sharing-card position in the base Displaywriter).

Pin Assignments

SIGNAL	PIN	(CONNECTOR)	PIN	SIGNAL
+RCV DATA (ENTER)	24	(1)	12	+RCV DATA (EXIT)
Not Used	23		11	+5 V
+XMIT DATA (ENTER)	22		10	+XMIT DATA (EXIT)
Not Used	21		09	Not Used
18.0 MHz (ENTER)	20		08	18.0 MHz (EXIT)
Not Used	19		07	Not Used
Not Used	18		06	GROUND
Not Used	17		05	ANR RCV
Not Used	16		04	ANR XMIT
Not Used	15		03	COM
Not Used	14		02	–SDRQCM
Not Used	13		01	–SDACKCM

SIGNAL	PIN	(CONNECTOR)	PIN	SIGNAL
Not Used	24	(2)	12	Not Used
Not Used	23		11	+5 V
–SDACKC	22		10	Not Used
–SDRQC	21		09	+SPIOEN
Not Used	20		08	Not Used
Not Used	19		07	Not Used
–SRST	18		06	GROUND
–SRDY	17		05	Not Used
Not Used	16		04	Not Used
Not Used	15		03	+S5MHZ
Not Used	14		02	Not Used
Not Used	13		01	Not Used

SIGNAL	PIN	(CONNECTOR)	PIN	SIGNAL
–SINTO	24	(3)	12	Not Used
Not Used	23		11	+5 V
–SIORD	22		10	–SIOWR
Not Used	21		09	Not Used
Not Used	20		08	Not Used
Not Used	19		07	Not Used
+SLA 15	18		06	Ground
+SLA 14	17		05	+SLA 13
+SLA 12	16		04	+SLA 11
+SLA 10	15		03	+SLA 09
+SLA 08	14		02	+SLA 07
+SLA 06	13		01	+SLA 05

SIGNAL	PIN	(CONNECTOR)	PIN	SIGNAL
+SLA 04	24	(4)	12	+SLA 03
+SLA 02	23		11	+5 V
+SLA 01	22		10	+SLA 00
–SLBHE	21		09	+SDATA 15
+SDATA 14	20		08	+SDATA 13
+SDATA 12	19		07	+SDATA 11
+SDATA 10	18		06	Ground
+SDATA 09	17		05	+SDATA 08
+SDATA 07	16		04	+SDATA 06
+SDATA 05	15		03	+SDATA 04
+SDATA 03	14		02	+SDATA 02
+SDATA 01	13		01	+SDATA 00

Signal Descriptions

+SDATA 00 through +SDATA 15: The system data bus consists of 16 active-high lines. Odd-addressed byte transfers use +SDATA 08 through 15; even-addressed transfers use +SDATA 00 through 07.

+SLA 00 through +SLA 15: The system bus consists of 16 latched, active-high lines.

–SLBHE: This latched, active-low control line is used together with the +SLA 00 line to specify odd or even data transfer:

–SLBHE	+SLA 00	
0	1	Odd +SDATA 08 through 15
1	0	Even +SDATA 00 through 07

+SPIOEN: This programmable I/O-enable line, when high, allows devices to be selected by decoding their respective addresses on the address bus.

–SIORD: This active-low timing line is active during a PIO read cycle or DMA write cycle to indicate a valid address.

–SIOWR: This active-low timing line is active during a PIO write cycle or DMA read cycle to indicate a valid address.

–SRST: This line is low during POR sequencing and does not go high until successful completion of the power-on diagnostics.

–SDACKC: This is an active-low line for the DMA channel 1 acknowledge signal. It is activated during each DMA transfer of data from the Displaywriter to the controller.

–SDACKCM: This is an active-low line for the DMA channel 2 acknowledge signal. It is activated during each DMA transfer of data from the controller to the Displaywriter.

ANR RCV: Receive-from-the-controller line in the internal cable.

ANR XMIT: Transmit-to-the-controller line in the internal cable.

COM: Common line in the internal cable.

+S5MHZ: This clock, generated by the system card, is used to synchronize the –SRDY signal.

–SDRQC: This active-low DMA channel 2 request signal is activated whenever a byte of data is to be sent from the Displaywriter to the controller.

–SDRQCM: This active-low DMA channel 1 request signal is activated whenever a byte of data is to be sent from the controller to the Displaywriter.

–SINTO: This active-low, interrupt-level 0 signal is activated to indicate that (1) 1920 bytes of data have been received or transmitted or (2) a READ POLL or CONTROL WORD 2 command has been received.

–SRDY: This is an active-low open-controller ready line; it is activated whenever the adapter is selected during an I/O read or I/O write cycle.

+RCV DATA (Exit): This active-high line is the output of the optical isolator in the *receive* data path on the 3277-emulator card.

+RCV DATA (Enter): This is the same line as +RCV DATA (Exit).

+XMIT DATA (Enter): This active-high line is the input of the optical isolator in the *transmit* data path on the 3277-emulator card.

+XMIT DATA (Exit): This is the same line as +XMIT DATA (Enter).

+18 MHz (Exit): This is the output of the 18 MHz oscillator on the 3277-emulator card.

+18 MHz (Enter): This is the same line as +18 MHz (Exit).

Panel 1 Connectors

Pin designations for Panel 1 connectors 0 through 5 and for connector 7 are given in the base Displaywriter maintenance information. Figure 5 shows the relative positions of the Panel 1 connectors. Figure 6 gives information about connector 6A. Connector 6B is reserved for future expansion. For pin locations for the other end of the internal cable (Connectors C1 and B2), see Figure 7.

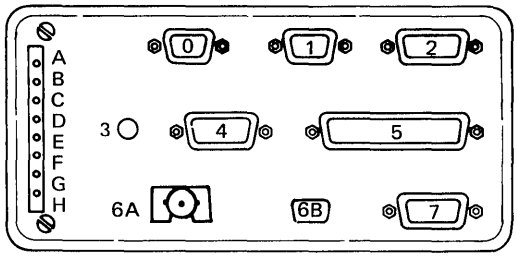
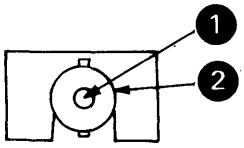
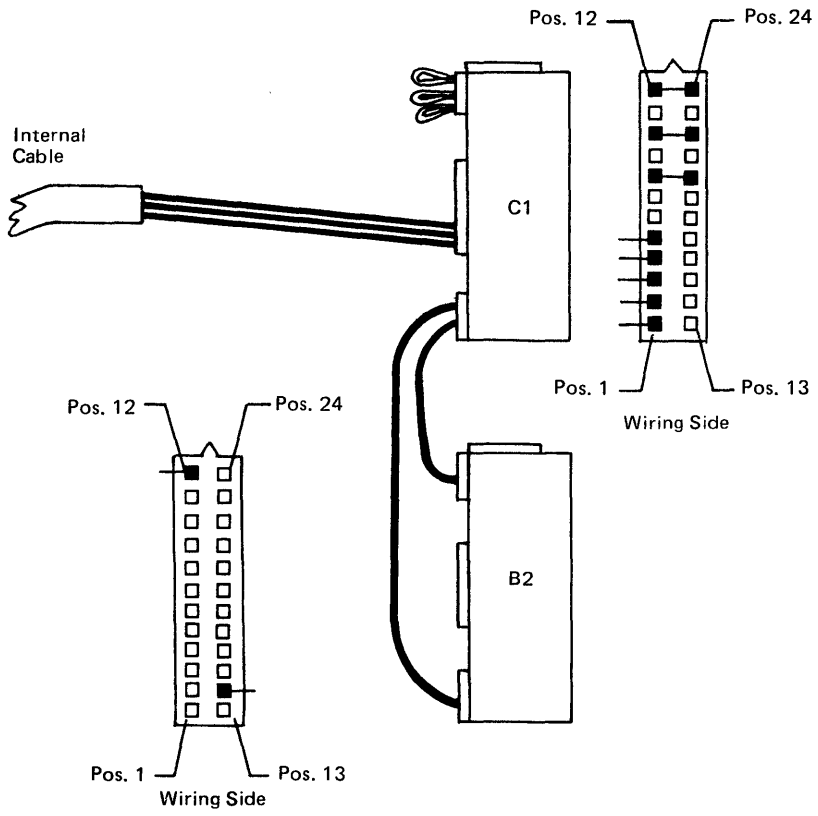


Figure 5. Panel 1 Layout



Distrib. Board C1 Pin Location	Identification
4, 5	Transmit, Receive
3	Coaxial Shield (Ground)

Figure 6. Coaxial Connector (6A)



Connector Position	C1 Connector	B2 Connector
1	To Pos. 12 of B2	
2	To Pos. 14 of B2	
3	Internal Cable Shield	
4	Internal Cable Inner Conductor	
5	Internal Cable Inner Conductor	
6-7	Not Used	
8	To Pos. 20 of C1	
9	Not Used	
10	To Pos. 22 of C1	
11	Not Used	
12	To Pos. 24 of C1	To Pos. 1 of C1
13	Not Used	
14		To Pos. 2 of C1
15-19	Not Used	
20	To Pos. 8 of C1	
21	Not Used	
22	To Pos. 10 of C1	
23	Not Used	
24	To Pos. 12 of C1	

Figure 7. Internal Cable (C1 and B2 Connectors)

REPLACEMENT PARTS

Refer to the base Displaywriter Parts Catalog for all FRUs and subassemblies of the 3277 Device Emulation RPQ. Figure 4 shows the locations of the replacement parts for the 3277 Device Emulation RPQ.

LOGIC CARD REMOVAL

See the base Displaywriter maintenance information for procedures for the removal and replacement of electronic logic cards.

INTERNAL CABLE REMOVAL AND REPLACEMENT

Refer to Figure 8 when performing this procedure.

Removal

1. Turn the power off.
2. Remove the display unit and place it to one side.
3. Remove the top cover of the electronics module.
4. Remove cable connectors from B2 and C1 of the distribution board.
5. Remove the electronics package and place it to the left.
6. Loosen the coaxial connector holding nut on Panel 1.
7. Remove the U-spacer. (Keep the U-spacer for installing the new cable.)
8. Tilt the coaxial connector and remove it through the 6A socket opening.
9. Lift the freed cable assembly out of the machine.

Replacement

Use the reverse order of the removal procedure, ensuring that the cable assembly is routed correctly and that the connectors are correctly installed.

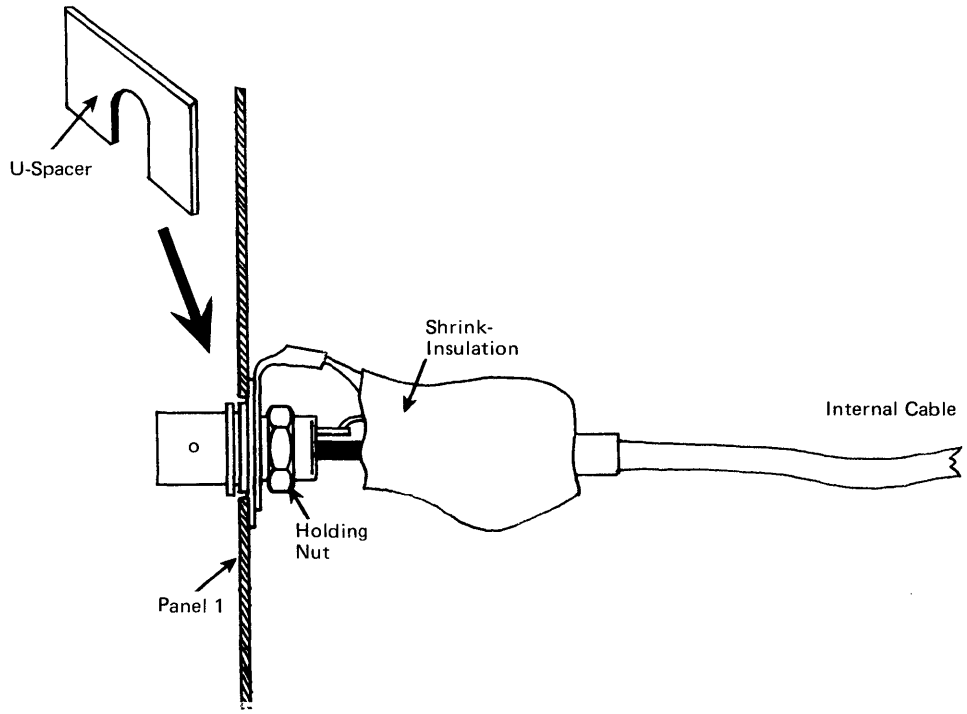


Figure 8. Panel 1 Coaxial Connector Detail

CABLE CHECKS

The CE diagnostics include two voltage measurements and a resistance measurement to ensure that the internal cable is in good condition. Figure 9 illustrates these cable checks.

- *Check 1* verifies that the driver high-level output is correct and that there is continuity in the internal cable.
- *Check 2* verifies that the driver low-level output is correct.
- *Check 3* verifies that there is no short-circuit between the BNC conductors and the chassis.

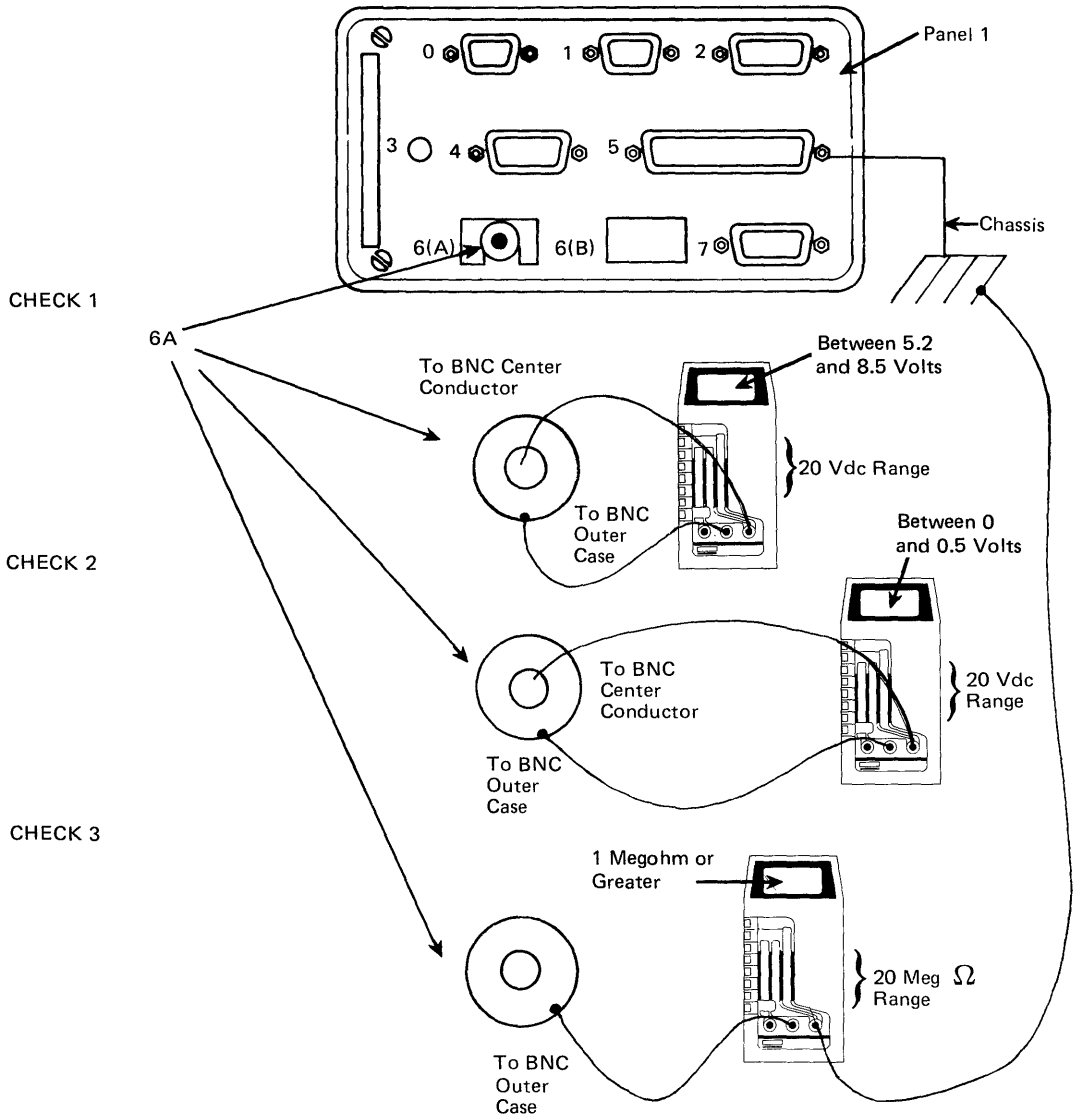


Figure 9. Voltage and Resistance Measurements

ISOLATING 3277-EMULATION INTERMITTENT PROBLEMS

1. **Intermittent errors while in 3277 device emulation mode?**

N Y

- With a stop set at step 25, loop on the 3277 MDI.
- Gently flex the internal cable at connectors B2 and C1 on the distribution board; then flex the internal cable at the coaxial connector (6A) on panel 1.

2. **Was there a failure?**

N Y

- Replace the internal cable.

- Check all ground wires for good connections.
- Continue to loop on the 3277 MDI.
- Print the MDI trace table.

3. **Was there a failure?**

N Y

- Perform the MDI trace table fix.
- The four FRUs that could cause a 3277-emulation failure are listed in the priority of substitution (in case the trace table calls out the same FRU twice):
  - 3277-Emulation Card
  - Internal Coaxial Cable
  - System Card
  - Distribution Board
- If a substitution does not fix the problem, swap the original FRU back into the machine.

- No failure.

- Solid errors: See Displaywriter MAPs.

APPENDIX A. THEORY OF OPERATION

The 3277 Device Emulation RPQ utilizes existing Displaywriter electronics and mechanics. A 3277 device-emulation logic card is connected to the system bus, and an internal coaxial cable provides connection from the 3277-emulation card to a controller. The controller, in turn, is attached to the host system, either locally, by means of a system channel, or remotely, by means of modems and a telecommunication line.

System Bus

The cards and function blocks (within the cards) are connected by the system bus (Figure 10), which carries data and instructions through the system.

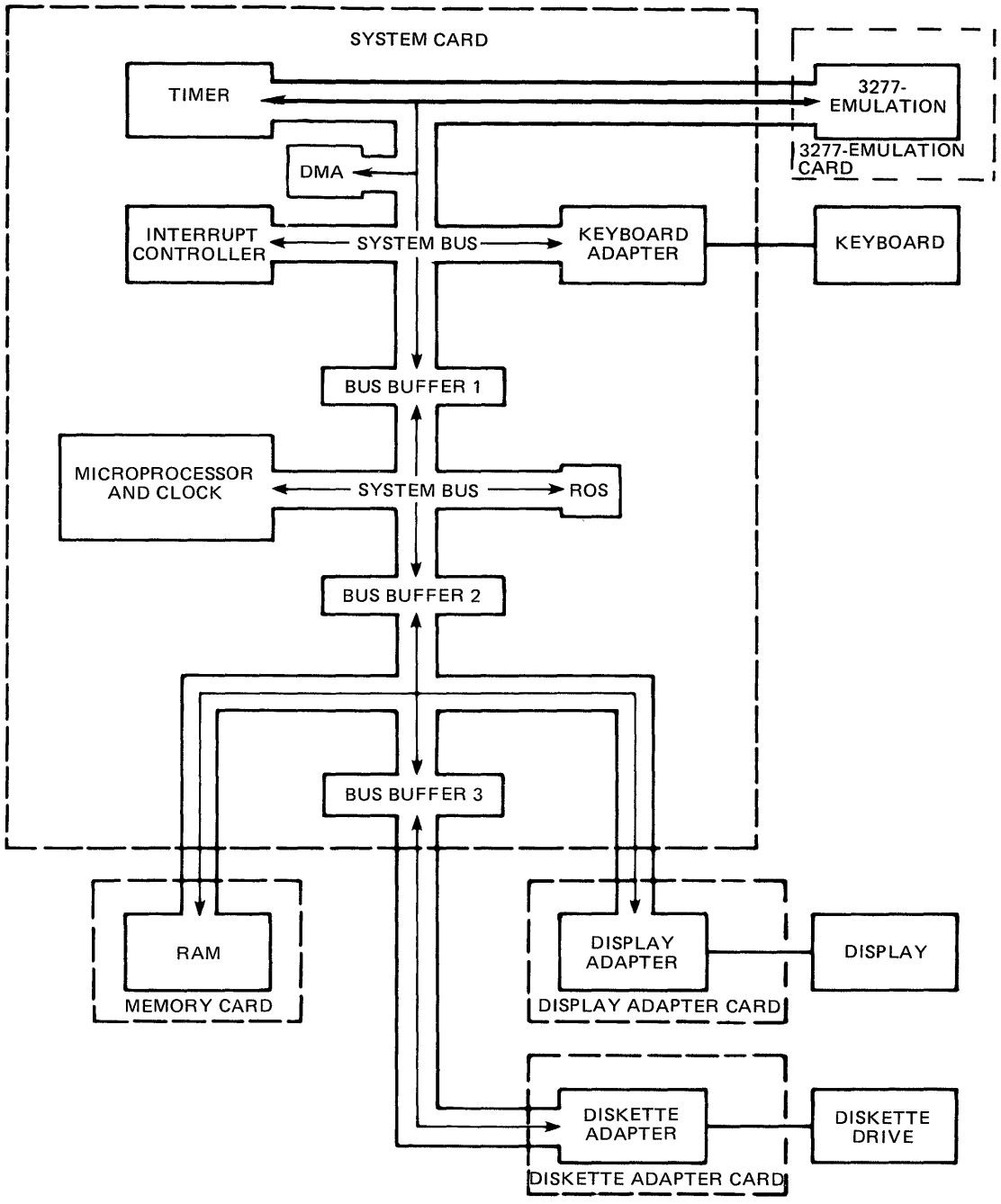


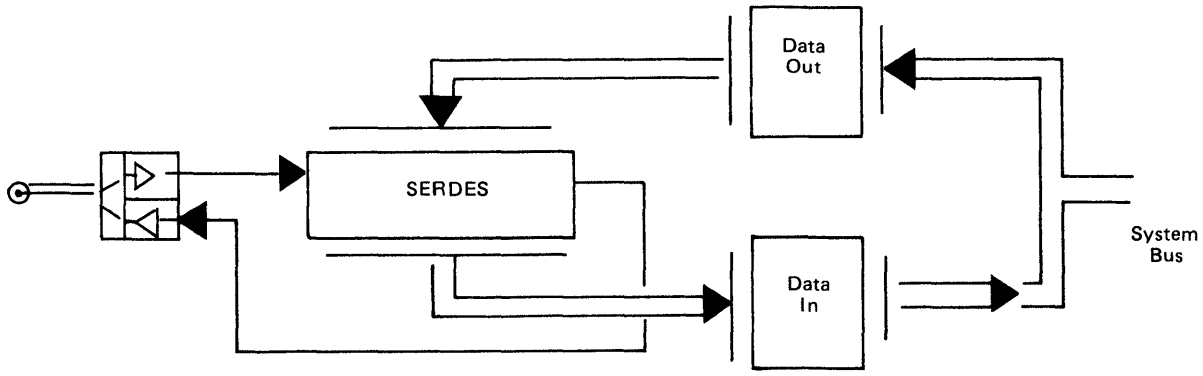
Figure 10. Displaywriter System Bus

3277-Emulation Card

The 3277-emulation logic card is a 4-wide-by-6-high electronic card located in position C of the distribution board. The 3277-emulation card includes the following components:

- Command registers
- Status registers
- Data registers
- SERDES (serializer/deserializer)
- System-bus buffers
- Line drivers
- Parity-checking and -generating logic
- Diagnostic logic

The main data flow among these items is shown in Figure 11.



Data Out:

1. From Displaywriter.
2. To data-out register.
3. To SERDES (parallel in, serial out).
4. Serial data to output driver.
5. Through internal cable to host system.

Data In:

1. From host system through internal cable to input driver.
2. To SERDES (serial in, parallel out).
3. To data-in register.
4. To Displaywriter system bus.

Figure 11. 3277-Emulation Card Data Flow

READER'S COMMENT FORM

Please use this form only to identify publication errors or request changes to publications. Technical questions about IBM systems, changes in IBM programming support, requests for additional publications, etc., should be directed to your IBM representative or to the IBM branch office nearest your location.

Error in publication (typographical, illustration, and so on). **No reply.**

Page Number *Error*

Inaccurate or misleading information in this publication. Please tell us about it by using this form. We will correct or clarify the publication, or tell you why a change is not being made, provided you include your name and address.

Page Number *Comment*

Note: **All comments and suggestions become the property of IBM.**

Name _____

Address _____

IBM Displaywriter System
3277 Device Emulation
RPQ 8D0098
PRPQ P10034
Product Support Manual

SY09-1024-0

SY09-1024-0

Fold

Fold

IBM Canada Ltd.
Information Development
Dept. 849
Don Mills, Ontario
M3C 1H7

Fold

Fold

IBM

International Business Machines Corporation

IBM Displaywriter System 3277 Device Emulation RPQ 8D0098 PRPQ P10034 Product Support Manual Printed in U.S.A. SY09-1024-0

International Business Machines Corporation

Displaywriter System 3277 Device Emulation
RPQ 8D0098, PRPQ P10034 Product Support Manual

SY09-1024-0

Printed in U.S.A.